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BR DOC 650

ACCOUNTS AND PAPERS:

TWENTY-ONE VOLUMES.

—(17.)—

PUBLIC HEALTH;
WOODS AND FORESTS.

Session
30 *April* —— 28 *August* 1857.

41

VOL. XLI.

1857—Sess. 2.

BR DOC 650

ACCOUNTS AND PAPERS:

1857—Sess. 2.

TWENTY-ONE VOLUMES:—CONTENTS OF THE

SEVENTEENTH VOLUME.

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BOARD OF HEALTH.

RETURN to an Order of the Honourable The House of Commons, dated 25 May 1857;—*for*,

A RETURN "of the EXPENSES of every Description connected with the PRINTING, PUBLICATION, POSTAGE, and CIRCULATION incurred by the BOARD of HEALTH for a PAPER called 'THE WEEKLY RETURN OF THE HEALTH OF THE METROPOLIS' from the Commencement of Vol. I. to the present Time."

FIVE Numbers of the above-named "Weekly Return" were published prior to the date of the Order of The House of Commons. The expense of printing those Numbers is stated in the following Letter from the Comptroller of Her Majesty's Stationery Office:—

Sir, Stationery Office, 29 May 1857.

I BEG to state, in answer to your letter of the 28th instant (inquiring the expense of printing the Weekly Return), that the cost of the paper and printing of the first five Numbers of the Weekly Return, entitled "Health of the Metropolis," amounted to 62 *l.* 18 *s.* 5 *d.* But, as some extra expenses were incurred in the printing of the first Number, the expense per Number may be estimated at about 11 *l.* 13 *s.* 8 *d.*

I am, &c.
(signed) *J. R. M'Culloch,*
Comptroller.

T. Taylor, Esq., &c. &c. &c.
Board of Health.

In addition to the expense estimated for in the above, the only other expense hitherto incurred has been for postage, which will be charged, as against this department, on about 230 copies circulated weekly. The labour connected with distributing these copies has, thus far, been performed in the office of the General Board of Health, and without any cost being incurred in respect thereof.

BOARD OF HEALTH.

RETURN of the Expenses of every Description connected with the Printing, Publication, Postage, and Circulation incurred by the Board of Health for a Paper called "The Weekly Return of the Health of the Metropolis," from the Commencement of Vol. I. to the present Time.

(*Mr. Thomas Duncombe.*)

Ordered, by The House of Commons, *to be Printed,*
22 *June* 1857.

121—Sess. 2.

LOCAL BOARDS OF HEALTH.

RETURN to an Address of the Honourable The House of Commons,
dated 20 June 1856;—*for*,

A "RETURN from all LOCAL BOARDS of HEALTH acting under the Public Health Act, 1848, showing the following Particulars:

The Date of the CONSTITUTION of such Local Boards of Health;

The POPULATION of the respective Districts of such Local Boards of Health, according to the Census of 1851, so far as can be ascertained;

The Amount of MONEY, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues levied or received under the Authority of—

The Powers transferred to such Local Boards;

The Public Health Act, 1848, with the Consent of the General Board of Health;

Acts of Parliament subsequently obtained by such Local Boards, with Dates of such Acts respectively;

The Amounts of OUTLAY incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been Borrowed or otherwise Raised;

The Total ASSESSABLE VALUE of the PROPERTY upon which the several Rates are Levied;

The AMOUNT in the POUND Sterling annually Levied in respect of such Purposes in the last Financial Year of each Local Board, and the Total Receipts arising from all such Rates;

The Total INCOME and EXPENDITURE of each Local Board for such Purposes;

And the Total AMOUNT in the POUND of all RATES Levied in the last Financial Year of each Local Board."

(*Mr. Tite.*)

Ordered, by The House of Commons, *to be Printed,*
28 *August* 1857.

328—Sess. 2.

RETURN showing the Date of the Constitution of each LOCAL BOARD of HEALTH acting under the PUBLIC HEALTH ACT;—the POPULATION of the respective Districts of such LOCAL BOARDS of HEALTH, according to the Census of 1851, so far as can be ascertained;—The Amount of MONEY, if any, borrowed or otherwise raised on the security of the several Rates or Revenues levied or received under the authority of—The Powers transferred to such LOCAL BOARDS;—The PUBLIC HEALTH ACT, 1848, with the consent of the GENERAL BOARD of HEALTH;—Acts of Parliament subsequently obtained by such LOCAL BOARDS, with Dates of such Acts respectively;—The Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several purposes in respect of which any such MONIES shall have been borrowed, or otherwise raised;—The TOTAL ASSESSABLE VALUE of the PROPERTY upon which the several RATES are levied;—The Amount in the Pound Sterling annually levied in respect of such purposes in the last financial Year of each LOCAL BOARD, and the Total Receipts arising from all such RATES;—The Total INCOME and EXPENDITURE of each LOCAL BOARD for such purposes;—and the Total Amount in the Pound of all RATES levied in the last Financial Year of each LOCAL BOARD.

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues Levied or Received under the authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act, 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Aberdare - - - - - 24 August 1854.	14,999	- - No money has been borrowed under the powers of the Act			-	- - - -	56,942 14 2	- - -	- - -	- - -	- - 11 *d.*
Accrington - - - 1 September 1853.	10,376	- - -	- - -	- - -	- - -	- - - -	31,908 5 10	- - -	696 9 -	- - -	G. D. R., 6 *d.*
Altrincham - - - 14 February 1851.	4,488	- - -	3,000 - -	- - -	- - -	3,474 13 11	12,347 11 5	- 5 *d.* -	192 11 4½	Income, 192 11 4½ Expenditure, 173 10 -	s. d. S. D. R. - - 5 G. D. R., including highway rate - - 1 1 1 6
Alvaston and Boulton - 29 September 1851.	661	- - -	- - -	- - -	- -	- - - -	1,768 9 11	- 10 *d.* -	73 13 9	Income, 73 13 9 Expenditure, 83 17 9	- - 10 *d.*
Arnold - - - - - 15 May 1854.	4,704	- - No money has been borrowed under the powers of the Act			-	- - - -	From G. D. R. 4,441 12 2 highway rate, 8,214 18 6	- - -	172 - 3 from G. D. R., between 25 March 1855 and 25 March 1856, and 89 18 3 from highway rate; together 261 18 6	- - -	- - 2 *s.* 4 *d.*

Ashby-de-la-Zouch - - 5 October 1850.	unknown	- - -	10,000 - -	- - -	- - -	10,000 - -	Buildings, 8,268 6 - Land, 6,700 16 -	S. D. R., 8 *d.* - S. D. R., 2 *d.* -	571 8 4	571 8 4	G. D. R.: Houses, 8 *d.* Land, 2 *d.* S. D. R.: Houses, 8 *d.* Land, 2 *d.* Highway rate, 4 *d.*
Aylesbury - - - - 10 October 1849.	6,081	- - Have not borrowed money under the powers of the Act			-	- - - -	18,299 10 -	- - -	579 6 5	- - -	- - 1 *s.*
Baildon - - - - 18 August 1852.	3,008	- - -	3,000 - -	- - -	- - -	4,500 - -	5,472 19 2	- - -	- - -	- - -	- - 2 *s.* 4 *d.*
Banbury - - - - 5 August 1852.	8,715	1,200 - -	4,800 - -	- - -	- - -	Outlay incurred, 4,590 14 2 Estimated, 1,909 5 10	21,461 18 3	- - -	2,166 1 6 Rent of wharf, 60 - -	Income, 2,226 1 6 Expenditure, 2,453 19 5	Banbury, 2 *s.* 2 *d.* Neithrop, 2 *s.* Grimsbury and Nethersole - } 2 *s.*
Bangor - - - - 14 August 1850.	6,338	- - -	6,700 - -	- - -	- - -	6,462 12 -	10,506 - -	- 1 *s.* 6 *d.* -	655 16 -	Income, 1,004 16 - Expenditure, 1,834 10 -	- - 1 *s.* 2$\frac{15}{16}$ *d.*
Barnard Castle - - 9 June 1850.	4,600	- - -	5,900 - -	- - -	- - -	6,100 - - and a further sum of 2,000 *l.* is required to obtain an additional supply of water.	5,700 - -	*s.* *d.* S. D. R. - 1 10 G. D. R. - - 6 Water rate, - 2 2 6	489 11 2	Income, 489 11 2 Expenditure, 441 3 4 Leaving only 48 *l.* instead of 120 *l.* to apply in liquidation of debt.	*s.* *d.* S. D. R. and water rate - 2 - Highway rate - - 7 Lighting rate - - 6 G. D. R. - - - 6 3 7
Barnsley - - - - 28 June 1853.	15,000	2,500 - -	24,900 - -	- - -	- - -	24,900 - -	33,352 7 10 viz.—from S. and G. D. R., 27,112 10 3 and from highway rates, 6,239 17 7	S. D. R., 4 *d.* -	451 17 6	Income, 1,817 7 3 viz. from rates, 430 - - water rents, 1,387 7 3 Expenditure, 2,024 9 7	Within the boundary of the late Commissioners, 3 *s.* 4 *d.* Without - 9 *d.*
Barton, Eccles, &c. - - 11 September 1854.	9,720	- - "It is apprehended no answer will be required to these questions.—T. S. Rowlandson, Clerk to the Board."									
Batley - - - - 4 April 1853.	9,308	- - -	- - -	12,400 6 8	4 Aug. 1853 23 June 1856.	40,000 - -	21,487 3 3	- - 6 *d.* -	250 14 -	Income, 6,651 - 8 (including loan of 6,400 6 8) Expenditure, 6,676 18 6	- - 2 *s.*
Battle - - - - 22 July 1851.	3,847	- - -	2,400 - -	- - -	- - -	Outlay, 2,400 - - Liabilities, 1,300 - -	9,429 - -	*s.* *d.* Lighting rate 1 - S. D. R. 2 - G. D. R. - 6 Highway rate - 8 4 2	761 18 2	743 14 9	- - 4 *s.* 2 *d.*

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues Levied or Received under the Authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Beaconsfield - - - 2 October 1850.	1,684	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	252 2 4½	Income, 254 19 9 Expenditure, 250 10 2	—
Berwick-upon-Tweed - 31 October 1850.	16,002	- - -	14,032 11 8	- - -	- - -	14,440 10 10	39,254 4 9	2*s.* 3*d.*	1,576 9 9	Income, 1,576 9 9 Expenditure, 1,758 12 3	—
Beverley - - - - 7 August 1851.	8,913	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	- - 1*s.* 2*d.*
Bilston - - - - 16 October 1850.	24,420	- - -	28,000 - -	- - -	- - -	65,000 - -	48,205 16 8	1*s.* 6*d.*	7,205 - -	Income, 7,205 - - Expenditure, 6,995 - -	- - 1*s.* 6*d.*
Bishop Auckland - - 31 July 1854.	5,000 (about.)	- - -	- - -	- - -	- - -	- - - -	9,636 13 -	- - -	- - -	- - -	- - 1*s.*
Bolton - - - - 8 August 1850.	61,172	- - "The Corporation of Bolton, as Local Board of Health, obtained on the 16th June 1852 the consent of the General Board of Health to borrow 16,000 *l.*; of this sum only 400 *l.* has been raised, and it has been agreed that the Sewerage Works which this sum was to accomplish shall be defrayed out of the chief rents of the Corporation, amounting to 1,863 *l.* 13 *s.* 10 *d.* per annum, and out of rates proposed to be levied for the purpose."					189,000 - -	For Great and Little Bolton, 1 *s.* For Haugh, 1 *s.* 6 *d.*	6,498 - -	8,361 13 10	For Great and Little Bolton, 1 *s.* 6 *d.* For Haugh, 2 *s.*
Bradford (Yorkshire) - 25 September 1850.	103,786	- - -	10,080 - -	263,505 - -	1854	500,000 - - (about.)	263,105 - -	S. D. R., 1 *d.*	1,000 - - (about.)	- - The waterworks were only purchased in October last, therefore no Return can be made.	- G. D. R., 1 *s.* 8 *d.* - S. D. R., 1 *d.*
			In future water rents, a public water rate and the borough rate will be applied to the payment of interest on moneys alluded to in the 5th and 6th columns.								
Braintree - - - 3 July 1830.	4,340	- - "Works for drainage and water supply in the town of Braintree are now in progress, at an estimated cost of between 8,000 *l.* and 9,000 *l.* The Board are negotiating a loan for 8,000 *l.* on the security of the rates, but the transaction is not yet complete."									
Brecon - - - - 29 August 1850.	6,070	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	G. D. R. in St. John and St. Mary, 2 *s.* 2 *d.* St. David's, 1 *s.* 11 *d.*

Bridgend - - - - 17 September 1851.	2,331	- - -	440 - -	- - -	- - -	440 - -	4,083 - -	- 2s. -	376 - -	376 - -	- - 2s.
Bridgnorth - - - 29 December 1853.	5,724	- - -	5,550 - -	- - -	- - -	Outlay, 2,998 4 10 To be incurred, 2,551 15 2	12,886 - -	- 1s. - Retrospective rates } 6d. 3d.	526 3 5	Income, 526 3 5 Expenditure, 525 13 9	- 1s. 9d.
Bristol - - - - 7 August 1851.	137,328	- - -	On special district, called the High Level Sewer district, 20,000 - - On special district, called the Bedminster Sewer district. 9,500 - -	- - -	- - -	Contract for High Level district, 19,840 - - for Bedminster, 8,428 - - but more money will be wanted to finish them.	H. L. D., 77,158 - - Bedminster district, 20,878 - - but in the whole district, 454,769 - -	- 9d. - - 1s. 4d.	2,230 - -	see former answers	On High Level district, 9d. On Bedminster district, 1s. 4d.
Broughton - - - 11 February 1851.	4,448	- - -	3,000 - -	- - -	- - -	- - - -	12,347 11 5	- 5d. -	192 11 4½	Income, 192 11 4½ Expenditure, 173 10 -	- 2s. 6d.
Brynmawr - - - September 1851.	5,000 (about.)	- - -	6,600 - -	- - -	- - -	6,600 - -	6,826 6 6	- 2s. -	574 3 4	Income, 574 3 4 Expenditure, 1,046 7 6	- 2s. 6d.
Bulkington - - - 3 July 1850.	2,005	- - -	- - -	- - -	- - -	- - - -	- - - -	- - -	- - -	- - -	- 1s. 3d.
Burley - - - - 1 September 1854.	1,894	- - -	1,000 - -	- - -	- - -	1,500 - -	6,453 17 7	G. D. R. 93 11 6¼ Highway rate, 162 5 1	246 19 11½	Income, 275 4 11½ Expenditure, 261 1 1½	- - 1s. (viz., each rate, a sixpenny one.)
Barnham - - - - 20 July 1852.	900 (about.)	- - -	1,010 - -	- - -	- - -	Outlay, 1,330 - - Estimated, 700 - -	2,768 - -	- 3s. 2d. -	306 5 9	306 5 9	- 3s. 2d.
Burslem - - - - 2 August 1850.	19,725	6,600 - - (For a new Town Hall; cost to be repaid from the market tolls, which now amount to 1,600l. per annum.)	14,589 - -	- - -	- - -	For Town Hall, 7,178 - - For Drainage Works, 13,127 - -	36,099 - -	- - No rate yet levied; the works being just begun.	- - -	- - -	- - 2s.
Calne - - - - 30 January 1852.	3,500 (about.)	- - -	- - -	- - -	- - -	- - - -	5,890 - -	- 6d. -	125 18 4	125 18 4	G. D. R., 6d.
Cardiff - - - - 1850.	18,351	- - -	30,000 - -	- - -	- - -	30,000 - -	72,713 - -	- 9d. -	2,000 - -	Expenditure, 1,951 1 -	- 2s. 3d.
Carlisle - - - - 15 August 1850.	26,310	- - -	25,100 - -	- - -	- - -	25,110 6 7	59,579 18 7	No rate made -	Income, 23,000 - - Expenditure, 19,610 11 10	- - -	- - 1s.

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues Levied or Received under the Authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Beaconsfield - - - 2 October 1850.	1,684	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	252 2 4½	Income, 254 19 9 Expenditure, 250 10 2	—
Berwick-upon-Tweed - 31 October 1850.	16,002	- - -	14,032 11 8	- - -	- - -	14,440 10 10	39,254 4 9	2 s. 3 d.	1,576 9 9	Income, 1,576 9 9 Expenditure, 1,758 12 3	—
Beverley - - - - 7 August 1851.	8,913	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	- - 1 s. 2 d.
Bilston - - - - 16 October 1850.	24,420	- - -	28,000 - -	- - -	- - -	65,000 - -	48,205 16 8	1 s. 6 d.	7,205 - -	Income, 7,205 - - Expenditure, 6,995 - -	- - 1 s. 6 d.
Bishop Auckland - - 31 July 1854.	5,000 (about.)	- - -	- - -	- - -	- - -	- - - -	9,636 13 -	- - -	- - -	- - -	- - 1 s.
Bolton - - - - 8 August 1850.	61,172	- - "The Corporation of Bolton, as Local Board of Health, obtained on the 16th June 1852 the consent of the General Board of Health to borrow 16,000 *l.*; of this sum only 400 *l.* has been raised, and it has been agreed that the Sewerage Works which this sum was to accomplish shall be defrayed out of the chief rents of the Corporation, amounting to 1,863 *l.* 13 *s.* 10 *d.* per annum, and out of rates proposed to be levied for the purpose."					139,000 - -	For Great and Little Bolton, 1 *s.* For Haugh, 1 *s.* 6 *d.*	6,498 - -	8,361 13 10	For Great and Little Bolton, 1 *s.* 6 *d.* For Haugh, 2 *s.*
Bradford (Yorkshire) - 25 September 1850.	103,786	- - -	10,080 - -	263,505 - -	1854	500,000 - - (about.)	263,105 - -	S. D. R., 1 *d.*	1,000 - - (about.)	- - The waterworks were only purchased in October last, therefore no Return can be made.	- G. D. R., 1 *s.* 8 *d.* - S. D. R., 1 *d.*
			In future water rents, a public water rate and the borough rate will be applied to the payment of interest on moneys alluded to in the 5th and 6th columns.								
Braintree - - - 3 July 1850.	4,340	- - "Works for drainage and water supply in the town of Braintree are now in progress, at an estimated cost of between 8,000 *l.* and 9,000 *l.* The Board are negotiating a loan for 8,000 *l.* on the security of the rates, but the transaction is not yet complete."									
Brecon - - - - 29 August 1850.	6,070	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	G. D. R. in St. John and St. Mary, 2 *s.* 2 *d.* St. David's, 1 *s.* 11 *d.*

Bridgend - - - - 17 September 1851.	2,331	- - -	440 - -	- - -	- - -	440 - -	4,082 - -	- 2 *s.* -	376 - -	376 - -	- - 2 *s.*
Bridgnorth - - - 29 December 1853.	5,724	- - -	5,550 - -	- - -	- - -	Outlay, 2,998 4 10 To be incurred, 2,551 15 2	12,886 - -	- 1 *s.* - Retrospective rates } 6 *d.* 3 *d.*	526 3 5	Income, 526 3 5 Expenditure, 525 13 9	- 1 *s.* 9 *d.*
Bristol - - - - 7 August 1851.	137,328	- - -	On special district, called the High Level Sewer district, 20,000 - - On special district, called the Bedminster Sewer district. 9,500 - -	- - -	- - -	Contract for High Level district, 19,840 - - for Bedminster, 8,428 - - but more money will be wanted to finish them.	H. L. D., 77,158 - - Bedminster district, 20,878 - - but in the whole district, 454,769 - -	- 9 *d.* - - 1 *s.* 4 *d.*	2,230 - -	see former answers	On High Level district, 9 *d.* On Bedminster district, 1 *s.* 4 *d.*
Broughton - - - 11 February 1851.	4,448	- - -	3,000 - -	- - -	- - -	- - - -	12,347 11 5	- 5 *d.* -	192 11 4½	Income, 192 11 4½ Expenditure, 173 10 -	- 2 *s.* 6 *d.*
Brynmawr - - - September 1851.	5,000 (about.)	- - -	6,600 - -	- - -	- - -	6,600 - -	6,826 6 6	- 2 *s.* -	574 3 4	Income, 574 3 4 Expenditure, 1,046 7 6	- 2 *s.* 6 *d.*
Bulkington - - - 3 July 1850.	2,005	- - -	- - -	- - -	- - -	- - - -	- - - -	- - -	- - -	- - -	- 1 *s.* 3 *d.*
Burley - - - - 1 September 1854.	1,894	- - -	1,000 - -	- - -	- - -	1,500 - -	6,458 17 7	G. D. R. 93 11 6¾ Highway rate, 162 5 1	246 19 11½	Income, 275 4 11½ Expenditure, 261 1 1½	- - 1 *s.* (viz., each rate, a sixpenny one.)
Burnham - - - - 20 July 1852.	900 (about.)	- - -	1,010 - -	- - -	- - -	Outlay, 1,330 - - Estimated, 700 - -	2,768 - -	- 3 *s.* 2 *d.* -	306 5 9	306 5 9	- 3 *s.* 2 *d.*
Burslem - - - - 2 August 1850.	19,725	6,600 - - (For a new Town Hall; cost to be repaid from the market tolls, which now amount to 1,600*l.* per annum.)	14,589 - -	- - -	- - -	For Town Hall, 7,178 - - For Drainage Works, 13,127 - -	36,099 - -	- - No rate yet levied; the works being just begun.	- - -	- - -	- - 2 *s.*
Calne - - - - 30 January 1852.	3,560 (about.)	- - -	- - -	- - -	- - -	- - - -	5,890 - -	- 6 *d.* -	125 18 4	125 18 4	G. D. R., 6 *d.*
Cardiff - - - - 1850.	18,351	- - -	30,000 - -	- - -	- - -	30,000 - -	72,718 - -	- 9 *d.* -	2,000 - -	Expenditure, 1,951 1 -	- 2 *s.* 3 *d.*
Carlisle - - - - 15 August 1850.	26,310	- - -	25,100 - -	- - -	- - -	25,110 6 7	59,579 18 7	No rate made -	Income, 23,000 - - Expenditure, 19,610 11 10	- - -	- - 1 *s.*

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues Levied or Received under the authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act, 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Chatham - - - - 19 July 1849.	21,487	- - -	3,000 - -	- - -	- - -	3,000 - -	34,957 7 -	- 3 d. -	- - -	- - -	- 3 s. 4 d.
Chelmsford - - - 9 September 1850.	7,796	- - -	13,400 - -	- - -	- - -	13,400 - -	19,854 - -	- 9 d. -	744 - -	744 - -	G. D. R. - 1 s. 3 d. S. D. R. - 9 d.
Cheltenham - - - 28 May 1852.	35,051	13,850 - - viz., 11,000 *l.* borrowed for drainage works, 1,800 *l.* borrowed for making a new street, and 1,050 *l.* for making a survey of Borough.	- - -	- - -	- - -	Thirty annual payments of 636 *l.* 3 *s.* 4 *d.* on the said sum of 11,000 *l.* Thirty annual payments of 117 *l.* 1 *s.* 10½ *d.* on the said sum of 1,800 *l.*; and Thirty annual payments of 68 *l.* 6 *s.* 1 *d.* on the said sum of 1,050 *l.*	164,000 - -	A special district rate of 1½ *d.* to pay the said sum of 636 *l.* 3 *s.* 4 *d.* The other sums of 117 *l.* 1 *s.* 10½ *d.* and 68 *l.* 6 *s.* 1 *d.* are paid out of the general Borough Rate of 2 *s.*	S. D. R., 736 7 9 G. Boro' R., 13,720 9 10	Borrowed for drainage works, 11,000 - - Expended, 11,791 9 9 Borrowed for New street, 1,800 - - Expended, 1,818 6 2 The survey, for which 1,050 *l.* was borrowed, is not finished.	- 2 s. 1½ d.
Cheshunt - - - 13 July 1850.	5,579	- - -	- - -	- - -	- - -	- - - -	28,602 - -	—			
Christchurch (Monmouth) - 27 September 1855.	1,000 (about.)	- - -	- - -	- - -	- - -	- - - -	2,730 - -	—			
Clevedon - - - 31 March 1853.	1,999	—									
Clitheroe - - - 19 June 1850.	7,243	- - -	- - -	- - -	- - -	- - - -	15,495 5 5	- - -	- - -	- - -	- 10 *d.* for highway and lighting rates.
Coventry - - - - 23 June 1849.	36,000 (about.)	- - -	20,000 - -	- - -	- - -	Outlay, 22,900 - - Estimated, 6,700 - -	86,707 - -	On part - 2 *s.* On other part - } 1 *s.* 10 *d.*	6,800 - -	—	
Croydon - - - - 29 August 1849.	20,355	- - -	46,265 - -	- - -	- - -	46,174 - -	79,033 10 -	- 1 *s.* 1 *d.* -	2,650 - - (about.)	Income, 3,100 14 7 Expenditure, 2,706 8 1	- 1 *s.* 1 *d.*

Crumpsall - - - 7 April 1848.	3,151	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	G. D. R. - 1 s. 0 d. S. D. R. for part - - } 3 s. 8 d. For other part 2 s. 6 d.
Darlington - - -	—										
Dartford - - - - 4 September 1850.	6,224	598 16 6	12,000 - -	- - -	- - -	Outlay, 12,600 - - Estimated, 2,000 - -	28,000 - -	- 1 s. 11 d. -	8,196 6 10	Income, 20,000 - - Expenditure, 19,965 - - including loan.	- 3 s. 5 d.
Derby - - - - 15 July 1850.	40,609	16,800 - -	18,030 - -	- - -	- - -	17,130 - -	106,000 - -	- 6 d. -	5,000 - - since the constitution of the Board in 1850.	Income, including loans, since July 1850, and Rates, about 20,000 - - Expenditure, in same time, 18,300 - -	- 2 s. 6 d.
Dewsbury - - - 23 October 1851.	14,049	- - -	800 - -	18,600 - -	4 Aug. 1853 23 June 1856.	65,000 - -	30,816 10 6½	- 2 s. 4 d. -	3,596 13 4½	Income, including loan, 13,873 9 3½ Expenditure, 12,086 8 -	- 2 s. 4 d.
Diss - - - - 21 January 1851.	3,637	—									
Doncaster - - - 1 February 1851.	12,052	—									
Dorchester - - - 9 May 1853.	9,494	- - -	- - -	- - -	- - -	11,500 - -	11,558 - -	- 8 d. -	370 4 8	Income, 1,196 18 1 Expenditure, 1,060 2 6	s. d. G. D. R. - - 8 S. D. R. - - 7 Water - - 2 1 5
Dover - - - - 15 July 1850.	22,244	23,735 - - and two annuities on lives, one for 100 *l.* the other for 28 *l.*	72,700 - -	- - -	- - -	Outlay, 71,774 15 1 Liabilities, 1,523 13 11 To complete, 2,150 - - 75,448 9 -	70,651 - -	- 1 s. 2 d. -	4,077 - -	Income, 4,290 7 7 Expenditure, 3,885 4 -	- 1 s. 11 d.
Dudley - - - - 9 May 1853.	37,962	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	On the town - 2 s. 6 d. Do. country, 2 s.
Durham - - - - 19 July 1849.	13,168	9,700 - -	5,500 - -	- - -	- - -	5,500 - -	26,839 13 4	- 3½ d. -	359 7 1	359 7 1	s. d. G. D. R. - 1 3 S. D. R. - - 3½ 1 6½

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues Levied or Received under the authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act, 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Ecclesbill - - - May 1855.	3,700	- - -	- - -	- - -	- - -	- - - -	6,850 - -	- 1 s. 7 d. -	519 11 10	Income, 744 6 7 Expenditure, 636 - 2	- 1 s. 7 d.
Edmonton - - - August 1850.	9,708	- - -	- - -	- - -	- - -	- - - -	44,547 - -	on houses - 1 s. on land - 3 d.	1,377 10 2	Income about, 1,565 - - Expenditure, 1,631 14 8	G. D. R. on houses, 1 s. On land, 3 d.
Elland - - - - 3 October 1853.	5,000	- - -	- - -	- - -	- - -	- - - -	5,663 4 6½	- 1 s. 6 d. -	383 15 8	265 5 6	- 1 s. 6 d.
Ely - - - - 1 October 1850.	8,148	- - -	15,000 - -	- - -	- - -	15,000 - -	13,663 - - 40,488 - -	s. d. G. D. R. - 4 6 Rate for re-payment of loan - 1 8 Gas rate - 1 3 7 5	927 15 5 1,000 - - 1,927 15 5	Income, 1,927 15 5 Expenditure, 1,747 - -	Houses, 7 s. 5 d.* Land, 1 s. 1½ d.
Enfield - - - - 19 August 1850.	9,453	- - -	13,000 - -	- - -	- - -	12,673 10 -	15,532 - -	- 1 s. 2 d. -	656 12 11½	Income, 656 12 11½ Expenditure, 705 12 -	- 2 s. 1 d.
Epsom - - - - 9 March 1850.	4,129	- - -	13,581 - -	- - -	- - -	16,641 6 10	17,251 - -	- 2 s. 8 d. -	2,370 - -	Income from rates, 1,579 4 5 from private Improvement Act, 777 - 4	- 4 s. 3 d.
Eton - - - - 1849.	3,500 (about.)	- - -	1,700 - -	- - -	- - -	1,700 - -	4,500 - -	- 3 s.	650 - -	650 - -	- 3 s.
Exmouth - - - - 25 September 1850.	5,103	- - -	- - -	- - -	- - -	- - - -	10,836 10 6	- 1 s. -	460 9 4	502 7 7	- 1 s.
Fareham - - - - October 1849.	6,000 (about.)	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	- 1 s.
Gainsborough - - - 30 June 1852.	8,048	- - -	465 - -	- - -	- - -	465 - -	21,842 10 2	G. D. R. - 2 d. Paving and Lighting rate 1 s. 6 d.	- - -	- - -	- 3 s. (including Highway rate.)

* "The year in question is an extraordinary year, inasmuch as the highway repairs are considerably below the average, and the expenditure as much above.—*W. Marshall.*"

Garston - - - - 3 July 1854.	2,756	- - -	- - -	- - -	- - -	- - - -	27,769 - -	G. D. R. - 5 d. Highway rate 9 d.	1,569 17 11	- - -	- 1 s. 2 d.
Gateshead - - -	—										
Gloucester - - - 1 August 1849.	17,572	- - -	16,000 - -	- - -	- - -	16,000 - -	56,824 - -	- 6 d. -	1,241 12 7	Income, 4,337 11 5 Expenditure, 4,142 19 5	- - 1 s. 4 d.
Godmanchester - - 28 January 1850.	2,337	- - -	- - -	- - -	- - -	- - - -	3,877 17 7	S. D. R., 9 d.	144 13 7½	144 13 7½	- - 1 s. 5 d.
Great Grimsby - - 14 April 1851.	8,638	- - -	1,200 - -	- - -	- - -	1,200 - -	14,968 12 11	- 2 d. -	99 2 -	84 - -	- - 1 s. 7 d.
Halstead - - - - January 1853.	7,150	- - -	- - -	- - -	- - -	- - - -	13,511 - -	- 1 s. -	387 1 8½	Income, 403 - - Expenditure, 453 5 2	- - 1 s.
Harrow - - - - 29 September 1850.	2,813	- - -	2,000 - -	- - -	- - -	2,247 14 1¼	13,719 15 -	- 6 d. -	715 14 9¼	Income, 715 14 9¼ Expenditure, 737 10 9¼	- - 1 s. 3 d.
Hartlepool - - - 14 March 1851.	9,280	- - -	4,000 - -	- - -	- - -	4,000 - -	15,835 - -	- 2½ d. -	157 4 11	Income, 4,000 - - Expenditure, 1,602 4 -	G. D. R., 2 s. 2 d. S. D. R., 2½ d.
Hastings - - - - August 1851.	17,000 (about.)	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	- - 1 s. 7 d.
Havant - - - -	—										
Haworth - - - - November 1851.	3,005	- - -	1,840 - - (with power to borrow 300 l. more.)	- - -	- - -	2,100 - - (about).	3,846 - -	- 1 s. 3 d. -	180 - - (about.)	Income, 180 - - Expenditure, 172 14 6	G. D. R., 1 s. 3 d.
Hexham - - - - 25 November 1853.	5,231	- - -	- - -	- - -	- - -	- - - -	11,060 15 11	- 6 d. -	183 10 10½	Income, 321 12 -¼ Expenditure, 312 15 10¼	—
Heanor - - - - 21 August 1854.	3,427	- - -	3,700 - -	- - -	- - -	2,988 10 - (exclusive of solicitors and engineers' charges.)	3,781 - -	G. D. R., 2 s. Highway rate, 1 s.	241 10 1½ 70 19 10½	Income, 4,012 10 - (including loan). Expenditure, 443 12 6½	- - 3 s. (on a very defective valuation.)
Heckmondwike - - 9 May 1853.	4,540	- - -	- - -	6,199 13 4	4 Aug. 1853 23 June 1856.	20,000 - -	9,380 - 8	- 6 d. -	163 16 6	Income, 4,863 9 10 (including loan). Expenditure, 4,797 6 9	- - 1 s. 6 d.
Hitchin - - - - 9 March 1850.	6,378	- - -	13,833 - -	- - -	- - -	14,268 4 3	14,156 1 4	- 3 s. 3 d. -	3,339 1 10	Income, 3,339 1 10 Expenditure, 3,373 16 11	- - 3 s. 3 d.

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

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		The Powers transferred to such Local Board.	The Public Health Act, 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Holbeach - - - - 3 July 1850.	4,997	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	Town, 2 *s.* 8 *d.* Country, 1 *s.* 2 *d.*
Houghton-le-Spring - - 5 September 1854.	4,075	- - -	- - -	- - -	- - -	- - - -	8,141 16 8	Houses, 6 *d.* Land, 1½ *d.*	160 1 7½	264 2 2¾	On houses, 6 *d.* On land, 1½ *d.*
Ilfracombe - - - - 5 May 1851.	3,661	- - -	4,700 - -	- - -	- - -	7,000 - -	12,643 10 -	S. D. R., 10 *d.*	265 19 5	Income, 726 3 2 Expenditure, 2,900 - -	- - 1 *s.* 10 *d.*
Keighley - - - - - 20 September 1855.	15,500 (about.)	- - -	- - -	- - -	- - -	- - - -	20,340 - -	G. D. R., 1 *s.* 6 *d.*	- - -	- - -	- - 1 *s.* 6 *d.*
Kendal - - - - - 1 August 1849.	11,831	- - -	- - -	- - -	- - -	- - - -	29,057 - -	- - -	- - -	- - -	- - 1 *s.*
Keswick - - - - - March 1853.	2,618	- - -	- - -	- - -	- - -	- - - -	4,889 16 8	S. D. R.: Houses, 6 *d.* Land, 1½ *d.* G. D. R.: Houses, 4 *d.* Land, 1 *d.*	180 2 9½	Income, 186 3 - Expenditure, 186 2 10	Houses, 10 *d.* Land, 2½ *d.*
Kingston-upon-Hull - - 7 August 1851.	82,502	- - -	22,000 - -	- - -	- - -	25,000 - - (about.)	240,000 - -	On 28,345 *l.*, 8 *d.* On 120,000 *l.*, 2 *d.*	897 16 9½ 1,090 7 5½	- - -	In one sub-district, 2 *s.* 1¼ *d.* In another, 2 *s.* 3¼ *d.* In the third, 2 *s.* 8 *d.*
Kirkham - - - - - 10 January 1852.	2,799	- - -	2,062 - -	- - -	- - -	1,958 6 4	5,968 - -	- 10 *d.* -	165 10 6	Income, 165 10 6 Expenditure, 140 13 2	On buildings, 2 *s.* 8 *d.* On land, 1 *s.* 0¼ *d.*
Knighton - - - - 30 January 1850.	1,401	- - -	2,780 - -	- - -	- - -	3,905 5 6¼	2,783 14 -	- 3 *s.* -	284 15 -	Income, 284 15 - Expenditure, 229 5 1	*s.* *d.* G. D. R. - 1 6 S. D. R. - 1 6 Highway rate - 6 3 6
Lancaster - - - - 1 August 1849.	14,562	- - -	11,600 - -	32,500 - -	1852–55	44,100 - -	34,649 - -	- 2 *s.* -	2,309 - -	Income, 509 16 3 Expenditure, 115 9 3 exclusive of interest and repayment of principal.	- - 3 *s.* 4 *d.*

Launceston - - - - 25 September 1850.	3,800	- - -	7,800 - -	- - -	- - -	7,800 - -	Houses, 5,788 17 8 Land, 3,729 - 4½	Houses, 1 *s.* 4 *d.* Land, 4 *d.*	431 7 -	Income, 1,315 16 10 (including 800 *l.* borrowed.) Expenditure, 1,400 9 2	On houses, 4 *s.* 4 *d.* On land, 1 *s.* 1 *d.*
Layton with Warbrick - 23 October 1851.	2,563	- - -	2,500 - -	7,690 - -	14 June 1853	10,190 - -	12,463 15 2	*s.* *d.* Gas rates - 6 S. D. R. - 5 G. D. R. 1 2 Highway rate - - 7 2 8	825 18 5½	Income, 2,917 12 4 Expenditure, 2,888 10 7½	- - 2 *s.* 8 *d.*
Leamington - - - 18 August 1852.	15,692	- - -	12,053 - -	- - -	- - -	12,053 - -	84,584 15 -	S. D. R., ½ *d.*	159 9 7	- - -	- - 2 *s.* 3½ *d.*
Leicester - - - - August 1849.	60,642	- - -	- - -	48,000 - -	20 May 1851	48,000 - -	121,743 15 -	- 1 *s.* 8 *d.* -	9,831 7 7	Income, 11,825 6 2 Expenditure, 11,305 5 11	- - 1 *s.* 8 *d.*
Littlehampton - - - 8 February 1853.	2,436	- - -	- - -	- -	- - -	- - - -	7,375 15 4	- 1 *s.* -	471 7 1	Income, 471 7 1 Expenditure, 421 6 4	- - 1 *s.*
Litton - - - -	- -	- - No Local Board of Health is acting in this district.			—						
Llanelly - - - - 15 August 1850.	8,566	- - -	10,000 - -	- - -	- - -	Outlay, 11,018 17 8 Estimated to finish, 1,500 - -	16,828 15 -	*s.* *d.* S. D. R. 1 - G. D. R. - 2 Highway rate - - 6 1 8	4,491 8 8	Income, 20,303 2 6 Expenditure, 19,839 4 4	- - 1 *s.* 8 *d.*
Loughborough - - - 25 March 1850.	11,301	- - -	8,000 - -	- - -	- - -	8,514 15 -	21,930 1 11	G. D. R., 1 *s.* Drainage, 1 *s.* Lighting, 6 *d.*	1,051 16 1 819 18 3¾ 394 4 4¾	- - -	- - 2 *s.* 6 *d.*
Luton - - - - 19 June 1850.	10,648	- - -	- - -	- - -	- - -	About 13,000 - - shortly.	26,425 - -	- 2 *s.* 6 *d.* -	3,835 15 10	Income, 3,835 15 10 Expenditure, 3,796 3 11	- - 2 *s.* 6 *d.*
Malton - - - - 13 September 1854.	7,661	—									
Maidenhead - - -	—										
March - - - -	- -	- - -	- - -	- -	- - -	- - - -	44,130 5 3	—	—	—	—

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates of Revenues Levied or Received under the authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act, 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Margate - - - -	—										
Merthyr Tydfil - - 19 June 1850.	46,389	- - -	- - -	- - -	- - -	- - - -	101,274 - -	- - -	- - -	Income, 5,453 6 2 Expenditure, 4,712 6 10	G. D. R., 6 *d.* Highway rate, 6 *d.*
Middlesborough - -	—										
Mileham - - - -	—										
Mistley - - - -	—										
Morpeth - - - - 17 September 1851.	10,012	- - -	8,480 - -	- - -	- -	Outlay, 8,480 - - Estimated, 500 - -	G. D. R., 21,973 17 6 S. D. R., 7,626 - -	cannot be defined - 2*s.* -	cannot be stated 637 11 11¾	21 19 - 482 17 5	Town, 3*s.* 8 *d.* Country, 1 *s.* 4 *d.* Bedlington, 1 *s.* 6 *d.*
Nantwich - - - 24 September 1850.	5,579	- - -	10,432 - -	- - -	- - -	12,691 - -	11,617 1 6	- 2 *s.* 5 *d.* -	734 3 -½	Income, 11,540 8 1½ Expenditure, 11,468 5 3½	- - 3 *s.* 9 *d.*
Newark - - - - 11 August 1851.	11,330	- - -	- - -	2,500 - - 1,000 - -	24 July 1851	Outlay, 6,479 19 9 Estimated, 2,400 - -	22,512 6 7	- 10 *d.* -	845 14 10 and in addition to the produce of the rates, 500 *l.* is yearly received under a decree of the Court of Chancery.	- - - -	- - 10 *d.*
Newbury - - - - 30 June 1852.	6,574	5,535 - -	- - -	- - -	- - -	5,535 - -	16,804 - -	- 2 *s.* -	1,306 - -	Income, 1,824 15 6 Expenditure, 1,538 7 8	- - 2 *s.*
Newcastle-under-Lyme - 1850.	10,569	- - -	8,542 - -	- - -	- -	8,423 - -	25,317 11 9	- 8 *d.* -	503 14 11	Income, 503 14 11 Expenditure, 502 19 10	- 2 *s.* 6 *d.*

Newmarket - - - 20 September 1851.	4,500	- - -	3,100 - -	- - -	- - -	3,100 - -	11,395 - -	G. D. R., 1 *s.* S. D. R., 6 *d.*	774 8 1¼	Income, 774 8 1¼ Expenditure, 683 2 10¾	- - 1 *s.* 6 *d.*
Newton Heath - - 29 December 1853.	10,801	- - -	5,000 - - and sanction obtained to borrow 6,000 *l.* more.	- - -	- - -	Outlay, 3,000 3 8 Liabilities, 2,003 19 4	35,829 10 -	G. D. R., 1 *s.* Highway rate, 3 *d.*	5,335 2 5	Income, 5,335 2 5 Expenditure, 4,355 5 5½	- - 1 *s.*
Newport (Monmouth) 1850.	19,000 (about.)	- - -	16,000 - -	- - -	- - -	16,000 - -	72,492 - -	- 4 *d.* -	1,050 - -	- - -	- - 1 *s.*
Northallerton - - - 19 April 1851.	2,710	- - -	1,400 - -	- - -	- - -	1,242 11 10	4,958 13 2	- 6 *d.* -	111 6 3	- - -	- - 1 *s.* 6 *d.*
Norwich - - - 7 August 1851.	68,174	17,400 - -	11,000 - -	- - -	- - -	12,500 - -	145,462 - -	- 1½ *d.* -	890 18 1	Income, 21,209 - - Expenditure, 20,508 - -	- - 1 *s.* 8¼ *d.*
Nuneaton - - - 13 July 1850.	8,133	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	G.D.R., houses, 1 *s.* 8 *d.* Land, &c., 2½ *d.* Lighting rate, 10 *d.*
Ordsall - - - -	- - There is no Local Board of Health acting in this district.				—						
Ormskirk - - - - 1 April 1850.	6,178	- - -	11,700 - -	- - -	- - -	12,037 - -	11,631 1 -	- 1 *s.* 9 *d.* -	1,037 4 3	Income, 1,062 4 3 Expenditure, 495 - -	In addition to the G. D. R. and S. D. R., a water rate produces 382 *l.* 4 *s.* 10 *d.*
Ottery St. Mary - October 1850.	4,487	- - -	3,458 - -	- - -	- - -	3,458 - -	13,091 10 -	S. D. R., Houses, 9 *d.* Land, 2¼ *d.* Private improvement rate, 1 *s.*	195 4 -½ 54 2 -	185 - - (about.)	*s.* *d.* G. D. R. houses 1 - Land - - - 3 S. D. R. houses - 9 Land - - - 2½ Highway rate - - 4 Private improvement rate 1 - 3 6½
Over Darwen - - 8 June 1854.	11,703	- - -	4,000 - -	- - -	- - -	3,154 17 2	26,330 - -	- 3 *s.* -	2,190 10 6	Income, 5,229 13 10 Expenditure, 2,679 8 9	—
Penrith - - - 16 June 1851.	7,387	- - -	11,498 - -	- - -	- - -	11,744 11 5	11,710 - -	- 1 *s.* 11 *d.* -	1,162 1 10	Income, 1,162 1 10 Expenditure, 1,622 - 1	- - 3 *s.* 9 *d.*

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues Levied or Received under the Authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Penzance - - - - 5 September 1849.	9,170	- - -	12,000 - -	- - - -	- - -	14,231 9 -	19,432 11 7	S. D. R., 6 *d.*	147 14 10	Income: Water Revenue, 543 12 3½ S. D. R., 147 14 10 691 7 1½ Expenditure, 610 7 5	—
Plymouth - - - - 31 July 1854.	49,673	15,000 - -	19,630 - -	- - - -	- - -	15,000 - -	117,014 - -	Houses, 1 *s.* 8 *d.* Land, 5 *d.*	9,523 - -	9,523 - -	- - 2 *s.* 1 *d.*
Poulton, Bare, and Torrisholme. 31 March 1852.	1,301	- - -	120 - -	- - - -	- - -	120 - -	5,850 - -	G. D. R., Houses, 1 *s.* 4 *d.* Land, 4 *d.* S. D. R., 6 *d.*	224 5 - 10 10 -	240 3 8½ 10 10 -	Houses, 1 *s.* 4 *d.* Land, 4 *d.* S. D. R., 6 *d.*
Preston - - - - 14 August 1850.	69,542	- - -	36,350 - -	181,355 - -	14 June 1853	Outlay: On sewerage works, 24,604 9 1 Waterworks, 135,225 - - Extending same, 56,658 8 2 No estimate of future expenses.	Buildings, 185,882 - - Land, 6,963 - -	S. D. R., 3 *d.* Water rate; houses under 10 *l.* annual value, 1 *s.* 2 *d.* in £. Other consumers, per 1,000 gallons, 6 *d.*	1,960 6 6 Water rate and receipts, 8,447 10 5	Income by rate, 1,960 6 6 Expenditure, 1,090 10 6 Income by water, 10,225 10 - Expenditure, 9,654 1 4	G. D. R., 1 *s.* 5 *d.* S. D. R., 3 *d.* Water-rates, as before stated.
Reading - - - -	—										
Redcar - - - -	—										
Redruth - - - - 13 June 1853.	10,571	- - -	- - -	- - - -	- - -	- - - -	16,609 3 10	1 *s.* 4 *d.*	2,731 4 9	Income, 2,944 1 - Expenditure, 2,968 1 -	- 1 *s.* 4 *d.*
Romford - - - - 17 September 1851.	- -	- - -	- - -	- - - -	- - -	- - - -	14,795 12 6	- - -	- - -	- - -	- 1 *s.* 4 *d.*

Rotherham - - - 2 February 1852.	13,242	- - -	34,869 - -	- - -	- - -	Outlay, 34,896 - - Yet due, 4,755 - -	35,697 - -	Town part, 5s. 10d. Adjoining town - 5s. 4d. Buildings in country 2s. 8d. Land - 1s.	3,283 2 10	Income, 17,182 2 10 Expenditure, 18,268 2 6	Town - - 5s. 10d. Near town - 5s. 4d. Buildings in country - 2s. 8d. Land - - 1s.
Rugby - - - - 5 September 1849.	7,000	- - -	19,829 - -	- - -	- - -	19,829 - -	31,850 - -	- 1s. -	1,043 9 11	Income, 2,849 8 5 Expenditure, 2,206 5 8	- 2s. 2d.
Rusholme - - - 26 March 1851.	- -	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	- 1s.
St. Thomas the Apostle (Devon). 6 October 1849.	4,580 (about.)	- - -	4,000 - -	- - -	- - -	4,000 - -	8,984 8 9	S. D. R. - 7d. G. D. R. - 8½d.	500 17 –	Income, 695 13 4 Expenditure, 693 10 11	- 2s. 2½d.
Sandgate - - - - October 1850.	1,200	- - -	4,000 - -	- - -	- - -	1,600 - -	4,940 4 10	- 2s. 2d. -	606 2 6	633 13 –	- 2s. 2d.
Sawtry - - - -	- - There is no Local Board of Health acting for this district.				—						
Selby - - - - 14 April 1851.	5,298	- - -	12,200 - -	- - -	- - -	15,924 13 8	13,961 15 –	- 9d. -	353 3 7	3,036 5 3¾	- 2s. 6d.
Sheerness - - - 1 August 1849.	9,831	6,207 8 3	936 10 7	- - -	- - -	936 10 7	23,818 15 –	G. D. R., 1s. S. D. R., 1s. 4d. Highway rate, 4d.	1,810 16 8½	Income, 2,737 14 3½ Expenditure, 2,533 13 11½	- 2s. 8d.
Sherborne - - - 17 September 1851.	4,942	- - -	8,950 - -	- - -	- - -	6,780 - -	10,880 14 4	- 1s. -	780 19 6½	Income, 7,405 17 8 Expenditure, 6,238 15 1	- 2s.
Shipley - - - - 21 February 1853.	3,272	- - -	4,000 - - for sewerage works.	14,000 - - for water works.	3 July 1854	S. W. 4,000 l., W. W. 14,000 l., and 6,000 l. in addition.	Buildings, 13,164 8 -½ Land, 799 6 11½	- - -	- - -	- - -	- 1s. 11d.
Shirley - - - - 5 April 1853.	3,837	- - -	- - -	- - -	- - -	- - - -	9,167 17 5	- 7d. -	216 18 9½	Income, 156 18 3 Expenditure, 153 1 8	- 7d.
Sleaford - - - - 13 November 1850.	3,372	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	514 16 10	- 1s.
Smethwick - - - 22 April 1856.	- - This Local Board of Health has not been established for a year.				—						
Sowerby Bridge - - 15 August 1856.	6,000	- - This Board has not been established for one year -			- - -	- - - -	13,266 - -	—			

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

DATE of the Constitution of the Local Board of Health.	Population of District of the Local Board of Health, according to Census of 1851.	Amount of Money, if any, Borrowed or otherwise Raised on the Security of the several Rates or Revenues Levied or Received under the authority of			Dates of such last mentioned Acts respectively.	Amounts of Outlay incurred, or now estimated to be incurred, in effecting and completing the several Purposes in respect of which any such Monies shall have been borrowed or otherwise raised.	Total Assessable Value of the Property upon which the several Rates are levied.	Amount in the Pound Sterling annually levied in respect of such Purposes in the last Financial Year of the Local Board.	Total Receipts arising from all such Rates.	Total Income and Expenditure of the Local Board for such Purposes.	Total Amount in the Pound of all Rates levied in the last Financial Year of the Local Board.
		The Powers transferred to such Local Board.	The Public Health Act, 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Stratford-on-Avon - - 11 September 1850.	6,332	- - -	3,894 - -	- - -	- - -	S. D. R.: 2,815 10 9 G. D. R.: 894 - -	S. D. R.: 13,932 5 - G. D. R.: 25,560 - -	S. D. R. 5 d. G. D. R., 1 s.	257 10 10 858 4 -	Income, 1,147 12 6 Expenditure, 1,144 11 10	- - 1 s. 5 d.
Street - - - - 8 August 1853.	1,649	- - No money yet borrowed; no outlay incurred; and no rate yet levied				- - -	- - -	- - -	- - -	- - -	Houses, 8 d. Land, 2 d. Highway rate, 4 d.
Sunderland - - - 27 August 1851.	67,394	12,420 - -	4,500 - -	- - -	- - -	4,500 - -	139,349 - -	- 1 d. -	500 - -	500 - -	- - 2s. 6 d.
Swaffham - - - 30 January 1850.	3,858	- - -	200 - -	- - -	- - -	200 - -	6,652 2 6	S. D. R.: Houses, 8 d. Land, 2 d.	- - The money borrowed is repaid by annual instalments of 20 l.		- - 1 s. 2 d.
Swansea - - - - 14 August 1850.	31,461	11,150 - -	44,670 - -	- - -	- - -	44,500 - -	69,000 - -	- - Two rates of 1 s. each on one part of district, and two rates of 6 d. and 9 d. each on the other part.	5,609 - -	Income, 5,869 - - Expenditure, 5,412 - -	On part, 2 s. On other part, 1 s. 3 d.
Southampton - - -	—										
Stockton-on-Tees - -	- -	- - -	- - -	- - -	- - -	30,501 - -	—	—	—	—	—
Taunton - - - - 1 August 1849.	14,174	- - This Board has not borrowed any money, but shortly after its formation an estimate was made of the probable cost of effectually sewering the district; to defray this a special district rate of 4 s. 6 d. in the pound was levied, payable by five annual instalments, the last of which was collected before the 30th September 1855. The rate produced 6,463 l. 9 s. 11 d.; Payments made, 6,343 l. 12 s. 11 d. The balance is subject to several outstanding claims.					28,000 - -	- - -	- - -	- - -	S. D. R., 6 d. G. D. R., 1 s. 6 d. for a year and a quarter.
Tenby - - - - 21 November 1851.	2,982	- - -	- - -	- - -	- - -	- - -	8,952 - -	- 6 d. -	204 14 -	Income, 204 14 - Expenditure, 195 1 -	- - 6 d.
Tewkesbury - - - 1850.	5,878	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - 1 s. 3 d.
Thurmaston - - - 26 February 1851.	1,251	- - -	- - -	- - -	- - -	- - -	5,851 19 2	- 1 s. -	97 11 -½	Income, 97 11 -½ Expenditure, 111 18 10½	- - 1 s.

Tipton - - - - 19 July 1855.	24,872	- - A survey of the parish is now in progress. No money has yet been borrowed - -					- - -	G. D. R., 7½ d.	1,693 16 6½	- - -	- - 7½ d.
Tormoham - - - 1 August 1850.	11,474	1,000 - -	2,000 - -	- - -	- - -	3,000 - -	3,700 - -	G. D. R.. 1 s. 9 d. S. D. R., 1½ d. -	3,445 5 5	Income, 3,445 5 5 Expenditure, 3,295 10 9	- - 1 s. 10½ d.
Tottenham - - - 25 March 1850.	9,120	- - -	26,100 - -	- - -	- - -	25,769 19 10½	G. D. R., 51,105 15 - S. D. R. 33,407 - - Priv. Imp. R., 11,486 10 1	S. D. R., 7 d. Priv. Imp., 8 d.	1,345 17 4	Income, 26,100 - - Expenditure, 25,769 19 -½	- - 2 s. 8 d.
Towyn - - - - 30 April 1851.	2,814	- - -	- - -	- - -	- - -	- - - -	3,296 16 1	- - -	223 - 10¾	234 16 11	G. D. R., 1 s. -½ d. S. D. R., 1 s. 8 d.
Toxteth Park - - - 14 August 1855.	1,393	- - -	- - -	- - -	- - -	- - - -	18,140 10 -	Houses, 1 s. 5 d. Land, 1¾ d.	718 9 6	Income, 718 9 6 Expenditure, 650 16 11	- - 1 s. 6¾ d.
Tunstall - - - - 30 July 1855.	9,566	- - -	- - -	- - -	- - -	- - - -	17,905 - -	- - -	- - -	- - -	G. D. R., 2 s. S. D. R., 6d.
Tynemouth - - - 25 July 1851.	29,170	- - -	15,000*l*. sanctioned to be borrowed; 8,400*l*. actually borrowed.	- - -	- - -	13,000 - -	40,226 - -	- - 4 d.	cannot be stated at present -	-	s. d. G. D. R. - 1 4 Watching rate - - 4 Lighting rate - - 4 Sewer rate - - 4 2 4
Uxbridge - - - - 7 April 1849.	5,900	- - -	13,594 - -	- - -	- - -	13,320 - 6	21,787 10 -	- - 2 s. 3 d.	1,780 11 6	Income, 2,350 19 5 Expenditure, 2,298 - 10	- - 2 s. 3 d.
Wakefield - - - 9 May 1853.	22,066	Paving Debt, 3,200 - -	- - -	- - -	- - -	- - - -	Paving District, 33,200 - -	- - 5 d.	294 - -	Income, 294 - - Expenditure, 174 - -	
		Lighting Debt, 800 - -	- - -	- - -	- - -	- - - -	Lighting District, 41,120 12 -	There has been one rate of 5 d. to pay off this debt.	700 18 4½	Income, 821 8 9½ Expenditure, 840 15 2	- - 2 s. 8 d.
Walsoken - - - 30 June 1852.	2,740	- - -	- - -	- - -	- - -	- - - -	3,493 9 -	- - -	- - -	- - -	- - 1 s. 9 d.
Wallasey - - - 9 May 1853.	8,339	5,900 - -	4,500 - -	- - -	- - -	4,500 - -	46,000 - - (about.)	G. D. R., 1 s. 6 d. S. D. R., 3 d. for Seacombe district.	1,352 11 3	G. D. R. income, 2,736 18 4 Expenditure, 2,394 18 6 S. D. R. Income, 7 13 - Expenditure, 1,621 4 7	

RETURN showing the Date of the Constitution of each Local Board of Health acting under the Public Health Act, &c.—*continued.*

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		The Powers transferred to such Local Board.	The Public Health Act, 1848, with the consent of the General Board of Health.	Acts of Parliament subsequently obtained by such Local Boards.							
		£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.	
Waltham Holy Cross - 9 March 1850.	4,303	- - -	- - -	- - -	- - -	- - - -	19,065 – 6	- - -	- - -	- - -	Houses - 1 *s.* Land - 3 *d.*
Wanstead - - - -	- -	- - -	- - -	- - -	- - -	- - - -	6,913 – –	—			
Ware - - - - 20 August 1849.	5,000 (about.)	- - -	- - -	- - -	- - -	- - - -	- - -	- - -	- - -	- - -	Houses - 2 *s.* Land - 6 *d.*
Warwick - - - - 5 September 1849.	10,972	- - -	27,897 13 9	- - -	- - -	27,500 – –	G. D. R., 36,673 5 – S. D. R., 28,673 12 6	- 1 *s.* 2 *d.* -	1,380 18 4½	900 – – (about.)	- - 1 *s.* 8 *d.*
Waterloo-with-Seaforth - 23 June 1856.	3,100 (about.)	- - The Act has just been applied -		- - -	- - -	- - - -	16,100 – – (about.)	- - -	- - -	- - -	- - Rate of 1 *s.* 4½ *d.* now being collected.
Watford - - - - 15 August 1850.	4,500 (about.)	- - -	8,450 – –	- - -	- - -	Outlay, 9,344 10 – To be incurred, 100 – –	16,762 11 –	- 1 *s.* -	547 17 10	Income, 547 17 10 Expenditure, 498 7 7	*s.* *d.* G. D. R. - 1 – S. D. R. - 1 – 2 –
Wavertree - - - -	—										
Wednesbury - - - 26 December 1851.	14,281	- - -	- - -	- - -	- - -	- - - -	37,232 5 –	- 1 *s.* 6 *d.* -	- - -	- -	- - 1 *s.* 6 *d.*
Wellingborough - - 24 September 1855.	5,294	- - -	- - -	- - -	- - -	2,300 – –	12,900 – –	—			
Welshpool - - - 9 May 1853.	3,490 (about.)	Borrowed, 350 – – and sanction granted to borrow 8,000 – –	- - -	- - -	- - -	350 – –	8,829 – –	- 1 *s.* -	327 – –	327 – –	- - 2 *s.*
West Cowes - - -	—										
West Ham - - -	—										
West Retford - - - 8 April 1850.	653	- - -	- - -	- - -	- - -	70 – – voluntary subscription.	—				
Weymouth - - - 7 August 1851.	9,755	- - -	- - -	- - -	- - -	- - - -	48,671 11 –	- 1 *s.* 7½ *d.* -	1,564 16 3½	2,900 – ½	- - 1 *s.* 7½ *d.*

Wigan - - - - - 10 June 1850.	31,939	- - -	* 57,390 – –	- - -	- - -	88,000 – –	65,841 15 –	For Waterworks, 10 *d.* For sewers, 4 *d.*	1,046 2 5	Income, 1,046 2 5 Expenditure, 57,157 9 8	*s.* *d.* G. D. R. - 1 – Highway rate – 10 Water rate - – 10 Sewer rate - – 4 3 2
Willenhall - - - - 18 September 1854.	11,931	- - -	- - -	- - -	- - -	- - - -	27,606 5 2	Houses above 10 *l.* 1 *s.* Compound rate, 8 *d.* Land, 3 *d.*	920 – –	Income, 1,084 13 – Expenditure, 1,198 4 10	- - 1 *s.*
Wilton - - - - - 28 February 1853.	1,804	- - No money yet borrowed - -		- - -	- - -	Estimated outlay, 3,862 – –	2,961 – –	- - -	- - -	- - -	- - 1 *s.* 3 *d.*
Windhill - - - - 20 September 1855.	2,603	- - No money yet borrowed, and the financial year not yet complete.				—					
Windsor - - - - - 1849.	10,000 (about.)	- - -	- - -	- - -	- - -	- - - -	25,642 – –	- 2 *s.* -	2,192 – –	2,192 – –	- - 2 *s.*
Wisbech - - - - - 30 June 1852.	- -	- - No money has yet been borrowed -		- - -	- - -	- - - -	25,158 2 9	- - -	- - -	- - -	- - 1 *s.* 4 *d.*
Witham - - - - - 2 February 1852.	3,303	- - No money has yet been borrowed.		—							
Wolverhampton - - 17 June 1850.	59,998	20,000 – –	13,000 – –	20,000 – – Under the Improvement Act for market purposes, 1853.	14 June 1853	17,000 – – For street improvements, of which the said sum of 13,000 *l.* is part, and 33,000 – – For market purposes, of which the said sum of 20,000 *l.* is part.	126,646 – –	S. D. R., 3 *d.*, to meet the charge of 13,000 *l.*	9,428 3 2	Income, 9,428 3 2 Expenditure, 10,704 17 3	- - 1 *s.* 9 *d.*
Woolwich - - - - 18 August 1852.	32,367	- - -	Main drainage, 19,650 – – Private improvements, 12,500 – –	- - - - - -	- - - - - -	22,032 – – 14,665 – –	62,383 – –	- 5 *d.* -	2,545 – –	Income, 32,180 – – Expenditure, 36,697 – –	- - 6 *s.* 4 *d.*
Worcester - - - - 1 August 1849.	27,000 (about.)	- - -	- - -	- - -	- - -	- - - -	70,887 – –	- - -	- - -	- - -	Old city, 1 *s.* 8 *d.* New city, 9 *d.*
Worksop - - - -	—										
Worthing - - - - 5 August 1852.	5,500	9,408 – –	15,000 – –	- - -	- - -	18,000 – –	15,612 19 1	- 1 *s.* 2 *d.* -	796 14 5	Income, 796 14 5 Expenditure, 772 2 4	- - 2 *s.* 8 *d.*
Yarmouth, Great - - 7 August 1851.	27,000 (about.)	- - -	3,286 – –	- - -	- - -	3,286 – –	48,748 – –	- 1½ *d.* -	364 – –	364 – –	- - 2 *s.* 1½ *d.*
York - - - - - 15 July 1850.	36,302	- - -	- - -	- - -	- - -	6,243 2 5 (owing to the treasurer.)	110,620 – –	- 1 *s.* 3 *d.* -	6,574 15 10	Income, 7,791 9 4 Expenditure, 10,948 10 6	- - 1 *s.* 3 *d.*

* This sum of 57,390 *l.* was borrowed by the Wigan Local Board of Health, under the Public Health Act, 1848, and Local Acts of 1852 and 1853, conjointly.

LOCAL BOARDS OF HEALTH.

RETURN showing the Date of the Constitution of all Local Boards of Health acting under the Public Health Act, 1848; the Population of their respective Districts according to the Census of 1851; the Amount of Money, if any, borrowed or otherwise raised on the Security of the several Rates or Revenues; the Amounts of Outlay incurred; the Total Income and Expenditure of each Local Board, &c.

(*Mr. Tite.*)

Ordered, by The House of Commons, *to be Printed,*
28 *August* 1857.

328—Sess 2.

Under 3 *oz.*

COMMON LODGING HOUSES.

RETURN to an Order of the Honourable The House of Commons,
dated 16 June 1857;—*for*,

COPY "of any REPORTS made to the GENERAL BOARD of HEALTH on COMMON LODGING HOUSES."

LIST.

PART I.—METROPOLITAN DISTRICTS.

Reports from Medical Officers of Health on the Working of the Common Lodging Houses Acts - - - - - - - - - - - - - - - - - p. 1

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Reports from Local Boards of Health on the Working of the Common Lodging Houses Acts, in Districts constituted under the Public Health Act, 1848 - - - - - p. 4

PART I.

METROPOLITAN DISTRICTS.

REPORTS from MEDICAL OFFICERS of HEALTH on the Working of the COMMON LODGING HOUSES ACTS in the undermentioned Districts.

Part I.
Metropolitan Districts.

FULHAM.

Fulham.

MR. F. J. BURGE, officer of health, reports, that a large amount of benefit has been conferred, not only on the occupants of lodging-houses but on the community generally, by the operation of the Lodging Houses Acts. That the registered houses in this district are in a satisfactory condition, although, from the absence of efficient main sewers, the drainage of many of them is imperfect.

Mr. Burge suggests, that in some of the rooms too many lodgers are permitted, the police authorities taking as their guide the superficial space of the apartment, without reference to its cubical dimensions. And,

That rooms on the basement floors are allowed to be used as dormitories, although some of them are one or two feet under-ground, and, consequently, more or less damp and unhealthy.

Mr. Burge expresses a hope that the powers of these Acts should be extended, so as to include houses in the occupation of several families.

MILE END OLD TOWN.

Mile End Old Town.

Mr. Freeman, medical officer of health, reports, "That in the Mile End Old Town the existing arrangements appear fully to answer the purposes intended by the Legislature."

ST. GEORGE'S, EAST.

St. George's, East.

Mr. S. R. Pittard, medical officer of health, reports that, in an extensive medical practice, carried on for many years, he had ample opportunities of observing the

condition

Part I. Metropolitan Districts.

condition of the inmates of common lodging-houses, both before and after the passing of the Lodging Houses Acts, and he has thence derived a strong, general conviction of their success in improving the health and habits of such inmates.

ST. GEORGE'S, HANOVER SQUARE.

St. George's, Hanover Square.

Dr. Aldis, medical officer of health for part of this parish, reported as follows to the sanitary committee for the Belgrave sub-district on the 24th of February last: " On Friday, February 20th, I visited No. 9, Grosvenor Cottages, and ascertained that eight persons occupied one small front parlour; four females were then in bed; three of them in one bed; another female was up and dressed; two boys had gone to work, and the mother was out. I immediately informed the inspector, and wrote to the following effect to Inspector Reason, common lodging-house officer, Scotland-yard: 'Having ascertained that eight persons are occupying one small front room at No. 9, Grosvenor Cottages, Whittaker-street, Pimlico, not being members of the same family, I thought it my duty, as medical officer of health for St. George's, Hanover-square, to acquaint him of it, and hoped that he would be good enough to attend to the matter, as the persons living up stairs were already unwell, and this overcrowding might occasion additional sickness.' "

In another report, laid before the same committee at a meeting of the 10th of March last, Dr. Aldis states, " That Inspector John Brown has served a notice, under the Common Lodging Houses Act, upon the occupiers of the room, No. 9, Grosvenor Cottages, which was complained of in my last report as being overcrowded, and tenanted by more than one family: this step compelled them to remove, and they have taken one of the houses in Eaton Cottages."

Dr. Aldis continues: " The above state of things was accompanied with the grossest immorality, besides the great risk of disease breaking out in consequence of overcrowding. A girl lodging in the same houses had a child by one of the sons; prostitution was openly carried on, men being constantly admitted to the rooms, and the worst description of language was employed. Grosvenor Cottages consist of two rows of houses, forming a court, so that the contamination of disease and of bad example would be likely to spread in such a place. The more respectable inhabitants are delighted at their departure, and I believe that the Common Lodging Houses Act will work most beneficially to the public health, as well as to public morality."

ST. GEORGE, SOUTHWARK.

St. George, Southwark.

Mr. Rendle, medical officer of health, reports, that within the last few days he has inspected 25 lodging-houses, containing 141 rooms, and admitting 827 lodgers. Their present condition, with few exceptions, is very satisfactory, and certain suggestions for improvement in drainage, ventilation, and water receptacles were agreed to readily, and promised to be carried out. There is now, and for some time past has been but little sickness in these houses; and an inspection of the parish medical books shows a great contrast between the present and the former state of the health of the inmates. Mr. Rendle was parish surgeon for 17 years before he was appointed to his present office, and he can therefore personally speak to this fact. Then the worst cases of fever occurred in the common lodging houses, and a very large proportion, and by far the worst part of the duty of the parish surgeon, was the visiting of the sick in these houses. Now, very few cases of fever or any other disease occur; and by cleanliness, and prompt removal in case of attack, the spread of disease, amongst a class so likely to take it, is prevented. That it is almost impossible to overrate the good that has resulted from the operation of these Acts; and Mr. Rendle, on his recent visit of inspection, was quite pleased with the freshness of the air in the houses generally, as contrasted with what it used to be. That baths are greatly needed, and Mr. Rendle is of opinion that it may be a question, whether all common lodging-house keepers should not be compelled to subscribe to baths, if there are such established in their parishes, and to have the right of admitting a certain number of bathers. There appears to be more of outward order and decorum amongst the inmates than there used to be; but as it is a fact that vice has largely increased in this parish, it may be presumed that the vicious chiefly resort to smaller houses in back streets, where they are not so subject to the supervision of the police. That it would be most desirable if the same benefits conferred by the Act, such as periodical compulsory cleansing, proper arrangements for water-closets, tinted lime washes instead of cheap paper, and limitation of the number of inmates, could be extended to a class of houses very numerous in this parish which are underlet to families, not coming under the operation of the Lodging Houses Acts. Such houses are, at present, greatly overcrowded, filthy, abounding in bad arrangements, and the haunts of the worst and most infectious diseases.

St. Martin in the Fields.

St. Martin-in-the-Fields.

Mr. Beale, medical officer of health, reports that the class of men occupying lodging-houses in this parish are chiefly mechanics and single men, who prefer the cleanliness and regularity of these houses to others. They are, in fact, to them a sort of club-house. He has, many times, drawn the attention of the vestry to these houses, as models by which the condition of all houses occupied in tenements by the working classes should be regulated.

St. Margaret and St. John, Westminster.

St. Margaret and St. John, Westminster.

Mr. Barnard Holt, medical officer of health, reports that in these parishes the common lodging-houses are generally well conducted, cleanly and wholesome, and if these advantages could be afforded for families, he is quite sure the death rate would be materially diminished. Under the existing law a family, however large, may occupy a room, however small and unfit it may be, not only for convenience, but for health. Mr. Holt would wish the Legislature to adopt such measures as might appear advisable to secure to the poor, not living in common lodging-houses, more efficient ventilation. He is of opinion that the size of the room should regulate the number of its recipients, for it is impossible that the most effective sanitary measures can be attended with the desired result, while the rooms are so over-crowded, and the air so materially deteriorated. That the condition of the common lodging-houses under the present system is a very vast improvement upon the former state of things.

St. Olave, Southwark.

St. Olave, Southwark.

Dr. Vinen, medical officer of health for this district, reports that he finds the regulations under which common lodging-houses are placed in this parish strictly carried out. That the cleanliness, ventilation, and comfort of the licensed rooms offer a very marked contrast to those occupied by the families of the poorer classes, residing even in the same houses. Separation of the sexes, instead of the previous promiscuous herding together, must have worked a very salutary change. No disease has occurred in the lodging-houses in this district for nearly twelve months, but previously disease was of common occurrence. That the operation of the Acts has had a very beneficial effect in improving the health, habits, and morals of those who use these houses.

St. Pancras.

St. Pancras.

Dr. Hillier, medical officer of health, reports that, on the whole, he is convinced that the registration and inspection of the common lodging-houses works well; but he has observed, in several cases, that a supply of water to the closets is not always insisted upon, and this is very important. He is also of opinion that in this district the space allowed to each lodger is not sufficient; in some cases the allowance being less than 200 cubic feet for each person. That although proper provision is usually made for ventilation, yet the inmates generally contrive to prevent its action by closing all apertures with rags or paper. That there is no doubt, however, that great benefits have resulted from the Act; but there is often great difficulty in discovering what houses are used as lodging-houses, and he is convinced that many used as such in this district are not registered.

St. Saviour's.

St. Saviour's.

Mr. Bianchi, medical officer of health, reports that he is convinced that the health of the inmates of common lodging-houses is now far superior to that of the inhabitants of dwellings ordinarily occupied by the poorer classes, and also that habits of morality and cleanliness are more encouraged and insisted on. He believes that no wiser, or better plan could be devised, than to increase the number of these houses in all parishes where there are many poor residents.

SHOREDITCH.

Shoreditch.

Dr. Burnes, medical officer of health for this parish, reports, that during the year of his tenure of office, he does not know of any case of sickness of an epidemic character having arisen in a registered common lodging-house, although most of the lodging-houses in Shoreditch are situated in localities where epidemic diseases, as fever, are frequently recurring. He entertains a strong opinion that if the same sanitary regulations could be applied to the more densely inhabited houses in the metropolis, occupied by the poorer classes, as are now enforced on common lodging-houses, much sickness would be prevented.

WHITECHAPEL.

Whitechapel.

Mr. Liddle, medical officer of health, reports that during sixteen years, from 1833 to 1849, he had frequent opportunities, as medical officer of the parish, of observing the moral and physical evils which resulted from both sexes making lodging-houses places of common resort.

Sickness was frequent, caused in most instances by the over-crowded, filthy, and ill-ventilated state of the rooms. Since the recent Acts relating to lodging-houses have come into operation, great benefit has been conferred upon the class of persons using these houses, in consequence of the owners being now compelled to afford sufficient space for each bed, to pay strict attention to the cleanliness and ventilation of each apartment, and to provide a proper water supply for the use of the lodgers. From these circumstances, the number of cases of sickness is much diminished, and the medical officers of the union are now comparatively seldom called on to visit cases of fever, and other diseases in the common lodging-houses. The moral advantages, arising from the enforcement of order, and from the separation of the sexes must be obvious.

PART II.

PROVINCIAL DISTRICTS.

Part II. Provincial Districts.

REPORTS from LOCAL BOARDS of HEALTH on the Working of the COMMON LODGING-HOUSES ACTS in the undermentioned Districts constituted under the PUBLIC HEALTH ACT, 1848.

ACCRINGTON.

Accrington.

MR. BANNISTER, the clerk to the Local Board of Health, reports that these Acts have operated very beneficially in his district, and that although their powers are both stringent and extensive, they are fully justified by the state of things for which the Legislature intended to make provision. That there are seven common lodging-houses in this district, all of which require rigorous inspection. That it rarely happens that the Local Board of Health find it necessary to summon the keeper of any common lodging-house before the magistrates, as it is found that a warning from the inspector is sufficient to cause the correction of any abuse of an ordinary nature.

ALNWICK.

Alnwick.

Mr. Thompson, surveyor, reports that the Acts were applied to this town in 1851. About 18,200 inmates are yearly received in 14 lodging-houses, containing 30 rooms. There is accommodation nightly for 171, but the average nightly attendance is not more than 50. The greater number of these lodgers are poor Irish, with a few English and Scotch, who may be travelling from place to place. The houses in general are kept clean and orderly, being frequently visited by the proper authorities, and any violation of the law is promptly dealt with.

A marked

Part II. Provincial Districts.

A marked improvement is visible since the Acts came into operation. The habits of the lodging-house keepers are more cleanly; the houses are all provided with water-closets, and a plentiful supply of water is afforded for domestic purposes. The lodging-house keepers, in general, appear to be healthy, and the lodgers are well satisfied with the regulations made by the Board to ensure cleanliness and comfort.

There is difficulty experienced with those who take in lodgers for more than a week, as the Act does not apply in such cases, and consequently the houses are over-crowded, and not properly kept; but, taking everything into consideration, the Acts have operated well in this town.

ALTRINCHAM.

Altrincham.

Mr. Worthington, the clerk to the Local Board of Health, forwards a copy of a report made to the Local Board by the inspector of this district, to the effect that before the adoption of the Act, the houses were under no supervision, consequently they were over-crowded with lodgers, dirty, and always unhealthy; typhus, and other fevers, were generally raging, and many of the houses were harbours for thieves and vagabonds of the worst kind.

Since the adoption of the Act the houses have all been registered, and the number of lodgers each house may accommodate is regulated under a close inspection. The dwellings are therefore clean and healthy, and since 1851 there his not been a case of fever amongst them. In fact, they are now cleaner and more healthy than many of the cottages occupied by the labouring classes.

BANBURY.

Banbury.

Mr. Thomas Pain, clerk to the Local Board of Health, reports, that (with the exception of one common lodging-house, frequented by vagrants and the lower class of Irish) they are kept in good condition as regards cleanliness, and their sanitary state has been excellent; only two cases of sickness, and these unimportant, having been reported during the last two years. That the average weekly number of lodgers in the year 1855 was 297; in 1856 they amounted to 243. In 1855, the week showing the highest number was that ending October 18th, when the number reached 647, and on the night of the Thursday in that week (the Michaelmas, or hiring fair), the large number of 171 lodgers were accommodated. In the corresponding week, and on the same day, in 1856, the numbers were respectively 462 and 110. That there can be no doubt that the application of the Act has been decidedly advantageous in improving the condition of the houses, in reducing illness, and in increasing the comfort of the lodgers, as well as adding to the respectability of the neighbourhood in which the houses are situated. The lodging-house keepers do not complain of the operation of the Act, with the exception of one, who cannot profitably compete with the better management and accommodation of a neighbouring house.

BARNSLEY.

Barnsley.

Mr. W. H. Peacock, clerk to the Local Board, reports, that previous to the application of "The Public Health Act, 1848," to the township of Barnsley, the lodging-houses in the town (which were numerous in proportion to the population) were very improperly regulated, so far as related to sanitary purposes. Little, or no attention was paid to the ventilation of the sleeping apartments, where both sexes were crowded together, regardless of health and common decency. The supply of water (not being compulsory) was disregarded, and the drainage and privy accommodation, to a great extent, neglected. This state of things, coupled with the fact that these houses were inhabited by a migratory population, led to its natural result, namely, that sickness was rarely absent, the houses were wretched and miserable, and common decency was unheeded.

Such was the state of things with which the Local Board had to deal when they were called into existence. Proper bye-laws for the regulation of these houses were forthwith prepared, submitted to, and sanctioned by the Home Secretary, and the superintendent of police was appointed inspector of lodging-houses, with full powers to carry out the requirements of the Act.

So far as regards the working of the Acts, the chief complaint made by the keepers of houses is that they cannot now reap so rich a harvest as they formerly did. The limitation imposed on the number of inmates has considerably reduced the number of lodgers a house is allowed to accommodate, and the profits of the keepers have been correspondingly lessened. Readiness has been manifested to obey the bye-laws; and although some keepers have been summoned before the magistrates for allowing too many persons, and also married and unmarried persons to occupy, indiscriminately, one sleeping room, there has been generally a willing disposition shown to provide water, and execute all the works necessary for health, cleanliness, and comfort. The members and officers of the Local Board have inspected the houses at all hours, both by day and by night, and they have been attended to by the keepers with alacrity, though frequently their visits must have caused considerable inconvenience. That the Local Board of Barnsley have found the Act to work well, and the results of strictly enforcing its enactments upon 43 lodging-houses have been most gratifying. If visited by day they will be found to be cleanly in the extreme, well provided with water, and privy accommodation. The bye-laws are enforced so far as regards the whitewashing of the dwellings quarterly, and the providing of clean bedding at stated periods; and although the inmates, at first, expressed some dislike to the interference (though it was exerted in their behalf), and especially to the inspection at any hour without notice, they now fully approve of every thing done.

Perhaps there is no work the Local Board of Health of Barnsley has accomplished that more fully testifies to the value of the Public Health Act, than the good effects which have resulted from the regulation of lodging-houses, and it affords the Local Board great pleasure to report so favourably on this subject.

BEVERLEY.

Beverley.

Mr. Const, clerk to the Local Board, reports, that there is a great improvement in the management and appearance of the common lodging-houses in this town, since the Common Lodging Houses Acts came into operation; and there is no doubt the effect of the new regulations on the health and habits of the inmates has been decidedly beneficial.

BRIDGNORTH.

Bridgnorth.

Mr. J. J. Smith, clerk to the Local Board, reports, that the regulations to be observed by the Lodging Houses Acts are strictly enforced, the police for the borough being inspectors for this purpose; that the working of the Acts has produced excellent results; that the number of registered common lodging-houses is about 50; and, by enforcing the regulations, the apartments are now rendered entirely free from the pestiferous atmosphere which existed formerly; and there can be no doubt that, by the house drainage arrangements, and a regular and proper supply of water, the health of the inmates of these houses must, of necessity, be much benefitted.

BRISTOL.

Bristol.

Mr. Joseph Yeates, inspector of lodging-houses, reports that, in 1852, he was appointed to carry out the provisions of the Common Lodging Houses Act, 1851; that there were within the district of the Local Board 29 common lodging-houses, having boards over the doors with the inscription "Lodgings for Travellers." That these houses were generally filthy, badly drained, badly ventilated, and without a good supply of water; they were the resort of beggars and tramps of all descriptions, badly conducted, males and females sleeping in the same rooms indiscriminately; and these were often much overcrowded. That after the Act came into operation, 19 of these 29 houses were put into such a condition as to induce Mr. Yeates to recommend them for registration, and they were accordingly registered, the others being discontinued as lodging-houses. That these 19 houses were properly cleansed, provision made for the separation of the sexes, the number of beds reduced, and where married couples were to be lodged, rooms were set apart for their use, and divided by partitions, so as to ensure privacy to each couple; the drainage and ventilation were improved, better privy accommodation provided, and a good supply of water obtained. That on a strict and close inspection of the district, Mr. Yeates found a much worse class of lodging-houses than those above alluded to, viz. houses occupied by Irish labourers, fruit venders, thieves, &c.; these houses were very badly conducted, overcrowded, and filthy in the extreme. In one instance, 17 persons, males and females, were found sleeping in one room, without bedsteads or furniture, straw or shavings on the floor serving for beds, and 9 or 10 persons of both sexes living in one room in this manner, was not uncommon. That the necessary notices according to the Act were served upon the keepers of these houses, and more than 60 of such places were ridded of their occupants, 12 only being registered after being put into proper condition. In addition to these two classes of lodging-houses, Mr. Yeates visited several which did not strictly come within the operation of the Act, being let out in apartments to families, and through his interference they were cleansed and repaired, and the health and comfort of the inmates much promoted. The total number of lodging-houses registered in pursuance of the Act has been 44, calculated to afford accommodation to 953 persons; but 27 is the number now registered, with accommodation for 570 persons; and these houses, upon an average, are never half full. In the registered houses there has never been a case of fever, or of any contagious disease. The reduction in the number of lodging-houses, and the diminished number of lodgers, may be accounted for in the following manner: First, house rent is so low in certain parts of Bristol, that unfurnished rooms can be obtained at a rent of from 6 *d.* to 1 *s.* 6 *d.* a week. Secondly, furnished houses are let in separate rooms to families, at the rent of from 2 *s.* to 3 *s.* per week. Thirdly, single men, such as mechanics, can obtain apartments in private houses for about 1 *s.* 6 *d.* per week. And lastly, the beer shops and coffee shops accommodate strangers at so low a charge, that many are induced to take up their quarters there. This last class of lodging-house is in general kept clean, and not overcrowded. That the enforcement of the Act has been of very great benefit; for whereas, previously, the common lodging-houses (being without supervision) were dirty, unwholesome, and badly conducted, and their occupants herded together in a manner calculated to produce and encourage disease and immorality, they are now, under inspection, clean and wholesome, and the health, comfort, and morality of the occupiers have greatly improved.

BRYNMAWR.

Brynmawr.

Mr. Davies, clerk to the Local Board of Health, reports, that the working of the Common Lodging Houses Acts has been found very beneficial, and to have been accompanied by a marked improvement in the average state of health found in those houses, as well as in the neighbouring parts of the district; that the powers of the Common Lodging Houses Acts might be beneficially extended, so as to prevent the extreme and prejudicial over-crowding by day, which is found in some of the houses; and also to confer such powers of nocturnal inspection, either by the police or the officer of the Local Board, as would secure compliance with the regulations against over-crowding by night.

CHELMSFORD.

Chelmsford.

Mr. Wyatt, inspector, reports, that he has made a special inspection of all the common lodging-houses in his district, and found them in a satisfactory condition as regards cleanliness and ventilation. That in no instance has he found fever, or any infectious disease, in any of these houses, and he has never had occasion to make any complaint of infringement of the bye-laws.

CHELTENHAM.

Cheltenham.

Mr. Thomas James Cottle, inspector of lodging-houses, reports, that when the Act came into operation in this place there were 38 common lodging-houses, many of them in close courts and densely populated neighbourhoods, in the filthiest condition, and crowded with the lowest and most degraded class of persons. That the number of registered houses is now 16, and the greater proportion of them are of the larger class of houses, containing from 6 to 10 rooms each; the smaller houses have almost ceased to exist as lodging-houses from the occupiers having discovered that the number of lodgers they were allowed to take was too small to answer their purpose. That the houses now are greatly improved in order and cleanliness, those frequented by the lower order of

Irish being still the least so; but of these, few now exist. That one great evil prevails in Cheltenham, which the present Act does not appear fully to meet; some of the resident Irish live permanently in a too crowded state in houses, which they divide with their relatives into two or more tenements. But other causes, to some extent, have tended to diminish the numbers, and improve the condition of the lodging-houses: for instance, the Local Act against hawking within the town; the active exertions of the "Mendicity Society;" the enlarged accommodation at the union; the removal of some of the worst localities and the improvement of others, by the operation of the Cheltenham Town Improvement Act; and the increased facilities for employment in Ireland, and its diminished population, have manifestly and steadily reduced the number of Irish tramps for some few years past. Mr. Cottle's experience of the operation of the Act, in a sanitary point of view, is most satisfactory; only one case of small pox, one case of imported cholera, and a few cases of hooping cough having occurred since the Act came into force; but he is strongly of opinion that a great advantage and security against the spreading of disease of an infectious character would accrue from the establishment of a small institution as a reception house for travellers, or other destitute persons attacked by infectious disease; for no such institution exists in the town at present, and the public charitable institutions very properly refuse to admit such such cases, and it certainly is not right to send them to the "Tramps' Ward" in the union. That, without question, the operation of the Act has been to very much ameliorate the condition of the travelling poor, both as regards comfort, cleanliness, and health, and it has led, in no small degree, to the suppression of scenes of indecency and immorality which were common formerly; the neighbourhoods in which these houses are situated have also improved with the improvement of the lodging-houses and their occupiers.

DURHAM.

Durham.

Mr. William Marshall, clerk to the Local Board, reports, that the effects of the regulations enforced under the Acts have been productive of much improvement in the health and habits of the inmates of the common lodging-houses. The bye-laws passed by the Local Board strictly enjoin due cleansing and ventilation, and forbid the over-crowding of rooms. These have proved most beneficial, no case of fever having occurred in the district since the Act was applied, whereas previously diseases of this description generally had their origin among the occupiers of these houses.

EDMONTON.

Edmonton.

Mr. Pulley, the clerk to the Local Board, transmits a report of the inspector of lodging-houses, who is of opinion, "That the regulations enforced under these Acts have been attended with beneficial results on the health and habits of the inmates of these houses. Greater cleanliness than formely prevailed is now observed; over-crowding in the sleeping rooms is prevented; common decency, so far as possible, enforced, and the health of the persons residing in these houses has been, for a considerable time past, generally good."

Mr. Pulley also states, that it is the opinion of the inspector, in which the Local Board entirely concurs, that the common lodging-houses, at the present time, exhibit a striking contrast to the dirty condition of most of the residences of the labouring poor.

EXMOUTH.

Exmouth.

Mr. H. C. Adams, the clerk to the Local Board, reports, that the Common Lodging Houses Acts have been very beneficial to the district, and that since their adoption the health and habits of the inmates of these houses have been materially improved.

GAINSBOROUGH.

Gainsborough.

Mr. Oldman, clerk to the Local Board, reports that in his district they have had no trouble with the common lodging-houses generally, and they appear to be well conducted. And Mr. Draper Wilson, the inspector, reports that the houses are kept remarkable clean, and the keepers of them comply with the regulations.

HASTINGS.

Hastings.

Mr. J. G. Shorter, town clerk, reports, that under the regulations of the Common Lodging Houses Acts much more cleanliness, decency and regularity have prevailed, and the houses are much better conducted than formerly. That there has been less sickness, and consequently less parochial relief has been required; that when the keepers of the houses are well disposed, the police obtain much valuable information from them.

HITCHEN.

Hitchen.

Mr. Godwin, the clerk of the Local Board, sends the following extract from a return made by the inspector of lodging-houses to the Local Board: "I visited the whole of the common lodging-houses on Saturday, March 28th, 1857, and found them clean, and not crowded in their sleeping-rooms. In my quarterly visits for the last three years there has not been a case of fever or other infectious or contagious disorder occurring in any such lodging-house, except one person with a slight fever, 12 months ago. I think the regulations for the management of these lodging-houses answer remarkably well."

KEIGHLEY.

Keighley.

Mr. Burr, the clerk to the Local Board, reports, that upon its formation a careful examination of lodging-houses took place, notices were issued for their general and annual registration, an inspector was appointed, and bye-laws to enforce improved management were prepared und sanctioned.

The consequence of frequent and vigorous visitation, enforcement of the Acts of 1851 and 1853, and the bye-laws (more especially in relation to over-crowding, the separation of the sexes, constant ventilation, frequent lime-washing and general cleanliness, both inside and out) has been that, although the number of houses has diminished, those now in use are more clean and orderly than formerly, and the health and habits of the inmates are very much improved.

LEICESTER.

Leicester.

Mr. Stone, clerk to the Local Board, reports that the number of common lodging-houses registered in Leicester is 34, with accommodation therein for 538 lodgers; a minimum space of 250 feet being required for each lodger. Tickets are affixed to each room, stating the number of persons allowed to sleep therein, and every room is required to be lime-washed, and the blankets, rugs and covers to be scoured at least four times a year; and to facilitate the enforcement of this rule the first weeks of March, June, September and December, are fixed for this purpose. The bed-rooms are ventilated by means of perforated zinc. The houses are inspected from time to time by the sanitary inspector, and occasionally by the officer of health. That the regulations made by the Local Board have greatly improved the cleanliness of these houses, and few instances of their violation have come to the knowledge of the Local Board. No case of fever has occurred in any of the registered houses during the past year.

MACCLESFIELD.

Macclesfield.

Mr. Parrott, town clerk, and clerk to the Local Board, forwards extracts from the annual reports made upon the subject of lodging-houses to the following effect, viz.: "That the Board prepared bye-laws (in 1853) for the regulation of lodging-houses, which have been approved of by the Secretary of State. Notices were served upon 224 lodging-house keepers, requiring them to register their houses. These houses were inspected by the officers, and it is impossible to convey even a faint idea of their condition. The state of filth in every form, the over-crowding, the mixture of sexes, and the moral degradation consequent upon it, in three or four localities, could not be exceeded in the worst parts of the metropolis. In four small cottages, with two bed rooms each, and two rooms on the ground-floor, there was an average of 188 persons lodged; they had a small yard, and the remains only of what had been two privies, all the ordure being in the open yard. In this yard was also a building, in a loathsome condition, occupied by a man, his wife and child, and one female lodger, the dimensions of the room on the

Part II.
Provincial
Districts.

the ground-floor being 6 ft. 2 in. long, by 4 ft. 4 in. wide, and 5 ft. 4 in. high; and the bed-room 9 ft. 8 in. long, 4 ft. 4 in. wide, and 5 ft. 4 in. high. This had been a nailor's shop, and the walls and floor were jet black. In the same yard, in one bed-room, 8 ft. 9 in. by 9 ft., and 7 ft. high, lived a husband, and wife, and six children. In another lodging-house near, there were three small rooms up-stairs; in the first were 16 men, women and children, lying together on the floor; in the second there were 12, also on the floor; and a third room up-stairs was used as a privy, the boarded floor being literally covered with human ordure. In the cellar two men lay on one bed on the floor. In the same yard, at the same time, but in another lodging-house, in worse condition than the last, there was a bed in the house-place, on which lay a woman in the pains of labour; by her side lay a man, apparently asleep, and 10 other men, women, and children were in the same room. This was at 2 a.m. In a back place, with the window out, and used as a receptacle for the filth of the house, lay three little children in some shavings. In the room over this lay six women and children on the floor, and in the front room were four beds on the floor, filled with men, women and children, varying from two to six in a bed. At another lodging-house, the same night, either 17 or 18 thieves and prostitutes were found drinking and playing cards; they all escaped over the yard-wall on being visited, in the expectation that it was the police; this description is an index to many others. The Board did not cease to exercise their powers with great energy; and in all the registered lodging-houses they have insisted upon, and have seen provided before registering, every requisite for a separation of the sexes, for cleanliness and ventilation, a supply of water, and proper out-offices and drainage, and the number to be lodged in each room is limited. The daily sweeping of the rooms, the weekly washing of the floors, the washing of the bed-clothes, and the white-washing have been duly observed, as the Board resolved not to permit a single infringement of the regulations. There are 41 lodging-houses registered to accommodate 444 persons, and in no instance have the Board had occasion to summon any keeper for disobeying the regulations, although the inspector is strict, and frequent in his visits. The Board congratulate the Council upon the improved state of the lodging-houses. They believe that no expenditure of labour or money could have too dearly purchased such a change as the one effected by the powers and regulations of the Board." In the following year, 1854, the Board report that "after two years' experience, the regulations have been found fully to answer the purposes intended." After reminding the Council of the state of things which the Report for 1853 disclosed, the Report for 1854 proceeds: "All these evils have been swept away; all these pest-houses have given place to clean and well-ventilated apartments, in which the numbers are limited, the sexes divided, and other sanitary provisions are made. For two years has this improved state of things existed; and although the Board are conscious that higher objects have been gained in a moral and social point of view, which they cannot estimate, they have the means of showing that physically great advantages have resulted. In taking the number of lodgers who have slept each night in the registered lodging-houses, it is found that the number of lodgments for the year has amounted to 115,000, and out of this number there have only been nine cases of sickness, and four deaths, three of the latter being children, and the fourth an adult, who died from the effects of imprudently drinking cold water. No fever, or other epidemic disease has visited a single lodging-house; which fact, when compared with the former registers of sickness and mortality in those localities where the old lodging-houses abounded, affords a happy contrast." * * * * * * "In some of the larger houses, where lodgers of every description are received, and the class by no means select, rules have been made by the keepers, and suspended in the rooms, such as 'No smoking allowed in the bed-rooms.' 'No spitting allowed on the floors.' These are decencies formerly unknown in such places, and the mere request for such observances is a sure indication of better habits. The improved description of bedding, almost universally provided in the registered lodging-houses, and its clean and neat appearance, is not the least of the additional comforts now secured."

"In looking at the number of lodging-houses under the old *régime*, being upwards of 200 (in place of 43, the present number), the question arises, 'What has become of the large race of itinerant tramps who were accustomed to frequent them?' One keeper states that for 20 years his house was crammed with them every night, whilst he now receives only a third of the number; others affirm the same fact; and the answer experience suggests is, that the new regulations throughout the country have necessarily imposed a higher charge for each individual lodger, to meet the difference on restricted numbers; and this, coupled with the stringent means adopted at most workhouses, has, in a great degree, put a stop to that system of tramping which, until recently, so generally prevailed."

* * * * * "The Board cannot sufficiently express to the Council the satisfaction they feel in having had the power to remove that which was a disgrace to a civilised community, and to substitute in its stead that which has already produced such salutary results."

The annual Report for 1855 shows * * * * * "That there are now 39 registered houses to accommodate 581 lodgers each night, and it is a singular fact that there has been only seven cases of sickness in these houses during this year, and three deaths; the cause of death in two cases being consumption, and the third was an infant. Not a single case of fever or other epidemic has occurred."

The Report for 1856 also proceeds in the same strain: "The regulations have been complied with, and the mention of that fact cannot fail to remind the Council of the difference between a four years' reign of cleanliness, limited numbers, with a division of sexes, and that state of things in existence previously, which degraded human nature, and shocked every sense of virtue and propriety. The police records and medical reports bear testimony to their comparative freedom from crime and disease. No idea can be formed of the blessings of such a change, and the Board sincerely believe that if all their labours and all their expenditure had been concentrated and devoted to the accomplishment of this single duty, the results in this short period would have richly compensated for all."

Malton.

Malton.

Mr. Walker, the clerk to the Local Board, reports that the Common Lodging Houses Acts work well in this district, and that the regulations which these Acts have enabled the Board to make with regard to common lodging-houses, must conduce to the health and improve the habits of the inhabitants of those houses.

March.

March.

Mr. Elliott, clerk to the Local Board, forwards a report from the inspector of lodging-houses, to the effect that in this district these houses are kept in a clean and healthy condition, and the conduct of the vagrants using them has improved; but the lodging-houses are also beer-houses, which is an evil, and prevents the intention of the Act from being fully carried out. The lodging-houses are three in number, which is sufficient for the accommodation of the neighbourhood.

Mr. Elliott also communicates the opinion of the Local Board that the effect of the Act has been to close several houses of a bad description, and its operation has been altogether beneficial in this district.

Margate.

Margate.

Mr. Reeve, the inspector of lodging-houses, reports that on his appointment to this office in 1852 there were two common lodging-houses in the town, both of which were unventilated, and in a filthy and unwholesome condition. That he immediately caused one of them to be closed, it being dilapidated and wholly unfit for human habitation. The other, registered to receive 30 lodgers, continues open, and with some little difficulty is kept in a tolerably cleanly state. That he is not aware of any epidemic having prevailed, or of any death having occurred in this house since 1852. That the tramps, &c., visiting Margate, chiefly resort to the licensed beer and public-houses, which are not under Mr. Reeve's control.

Merthyr Tydfil.

Merthyr Tydfil.

Mr. Henry Wrenn, inspector of common lodging-houses, reports that these houses are now much improved in condition, and no breach of the regulations has been committed for a considerable time. When appointed inspector in 1853, there was a large number of lodging-houses, in a crowded, filthy, and unhealthy condition. When the Act was put into force, the class of tenants for these houses altogether changed; striking instances of this are apparent in Bethesda-gardens, Imany-street, Bryant's-field, and other places. The houses are improved in tenants, cleanliness, and health, instances of over-crowding have become very rare, and disease is seldom met with. The houses occupied by the Irish are difficult to keep clean, and they are very often crowded with lodgers. In 1853 the night-houses for tramps were also very frequently in a dirty and crowded state. No regulations for cleanliness or decency were observed, the sexes were indiscriminately mixed, and any number of the worst characters were admitted at all hours, as the keepers of them could, and frequently did, refuse admission to the police. These houses are now greatly improved; they are much cleaner and more healthy, the sexes are divided, and the regulations and bye-laws are observed.

NEWPORT (Monmouthshire).

Newport (Monmouthshire).

Mr. Huxtable, superintendent of police, reports that the lodging-houses are under the inspection of the police, who visit them at any hour, by night or by day, and it is found that, generally, the owners comply with the regulations. They also show considerable anxiety to avail themselves of the lime-brushes provided by the Local Board, in order to keep their houses clean.

NORWICH.

Norwich.

Mr. Samuel Clarke, inspector of lodging-houses, reports, that the regulations of the Local Board, as respects common lodging-houses, have been successfully carried out. When the Act was first applied, the houses were filthy, over-crowded, and very badly ventilated, and the bedding equally filthy; but, since the Act has been put into force, and the houses registered, there is a marked improvement, which cannot fail to be observed by any person acquainted with the previous state of things. This must necessarily have a beneficial effect on the health and habits of the occupants; the sexes are now separated, the rooms and bedding cleansed, the walls lime-washed periodically, and the rooms thoroughly ventilated. In only two cases has it been necessary to take steps to enforce cleanliness, and the separation of the sexes. The health of the occupants has been remarkably good, and Mr. Clarke has had no occasion to put in force the power he possesses, on the occurrence of fever or other contagious disease.

NUNEATON.

Nuneaton.

Mr. Charles Buchanan, clerk to the Local Board, reports, that since the Act was put into operation, the lodging-houses in this district have improved, and, generally speaking, are well conducted. Since the formation of the Board in 1850, two of the then lodging-houses have ceased to be used for that purpose.

BARTON-UPON-IRWELL (PATRICROFT).

Barton-upon-Irwell (Patricroft).

Mr. Rowlandson, the clerk to the Local Board, states that, in consequence of this being an agricultural district, lodging-houses are but little used, except at harvest time, so that it has not been found necessary to make any stringent regulations about them. No case of fever or contagious disease has occurred among them during the last three years. They are under the inspection of the rural police.

PENZANCE.

Penzance.

Mr. Rodd, town clerk and clerk to the Local Board, transmits the report of the Committee appointed to consider the subject. It states that, prior to the regulations which the Act authorises being enforced, the lodging-houses were often in a filthy state, both as regards the interior generally, and the bedding also. The sleeping-rooms were crowded to excess, without distinction of sex or age; and no attention was paid either to the size or ventilation of the room. The effect of the enforcement of the provisions of the Act has been most beneficial to the health and habits of the inmates of the lodging-houses, and to the order of the town generally.

PLYMOUTH.

Plymouth.

Mr. Whiteford, town clerk, reports that the registered lodging-houses have been reduced from 40 to 21. No complaints have been made against any of these houses during the last two years, the proprietors readily conforming to the requirements of the inspectors; that there are, however, many houses which are practically lodging-houses, but which the owners deny to be such. The owners deny that they charge rent for the accommodation; the lodgers are alleged to be friends or relatives, and accommodated without payment; this class of houses is filthy and over-crowded.

ROMFORD.

Romford.

Mr. Bourne, the clerk to the Local Board, reports that the Common Lodging Houses Acts have worked beneficially in this district, and that the regulations made in pursuance of them, have been conducive to the health and improvement of the habits of the inmates.

SALISBURY.

Salisbury.

Mr. Marshall, town clerk, and clerk to the Local Board, reports that the Common Lodging Houses Acts have proved beneficial in this city. The inspector has invariably reported on the improved health and habits of the inmates.

SLEAFORD.

Sleaford.

Mr. Clements, clerk to the Local Board, reports, that during the last year there has been only one complaint against one lodging-house, and the proprietor thereof was summoned and fined. There has been no fever or contagious disease, and the bye-laws framed under the Act appear to have been generally complied with.

TAUNTON.

Taunton.

Mr. G. Stuckey, inspector of common lodging-houses, reports that for nearly five years he has filled this office, and he can bear testimony to the improvement which has taken place both in the health and habits of those using these houses. The number of lodgers, which the five houses registered are allowed to accommodate, is 65 daily, and during the above period of five years, only two deaths have occurred. During that time there has been no epidemic or infectious disease, with the solitary exception of a lodger being attacked with fever, and the attention of the medical officer of the parochial district being called to the case, the progress of the disease was arrested, without spreading among the other lodgers. The bye-laws and regulations are strictly enforced, and no obstruction has been offered to the directions given being fully carried out. The present state of things forms a striking contrast to what prevailed before the passing of the Acts, when lodgers were allowed to crowd indiscriminately together, quite regardless of sex or number. The sanitary and moral effect produced by the present system is of the most satisfactory nature.

TORQUAY.

Torquay.

Mr. Charles Kilby, inspector of lodging-houses, reports that in his district there are five houses registered as common lodging-houses; three resorted to by *bonâ fide* travellers, such as organmen, travelling tinkers, and china-menders, and the other two houses are chiefly occupied by a class of persons residing in the town. The health of the inmates has been very good, only two deaths having taken place within the last 12 months, and these were from natural causes. The Acts have proved beneficial, and (from the assistance rendered by the police) persons who have no visible means of subsistence, and the associates of suspected persons, avoid the registered houses, not wishing to have their names and descriptions taken, and they resort to the low public-houses, the keepers of which evade compliance with the requisitions of the Act.

TYNEMOUTH.

Tynemouth.

Mr. John Hewett, inspector of common lodging-houses, reports that in this district there are eighteen registered lodging-houses, which are kept clean and in good order. No report of sickness or infectious disease has been made, and the lodgers express great satisfaction at the improvement caused by the enforcement of the present regulations. Many applications to have houses registered have been refused, on the grounds of not having sufficient room, want of proper conveniences, and being out of repair. From the reports of the police, who are constantly visiting these houses, and from personal inspection, Mr. Hewitt considers the Common Lodging Houses Acts have worked with every success in the borough of Tynemouth.

WELLINGTON (Salop).

Wellington (Salop).

Mr. John Richardson, superintendent of police, reports that he has been appointed inspector of common lodging-houses, jointly with his constables. That since the passing of the last Act, in 1853, he has registered upwards of 200 houses in the towns of Wellington, Newport, Shiffnal, and Iron Bridge. The Acts have worked exceedingly well, and the habits of the inmates are much improved, and offences against the Acts and regulations are now very rare. In this county the expense of carrying out the Act is very trifling, none of the inspectors having extra salaries. Many of the houses occupied by the Irish are very inconvenient, and there has been great doubt as to whether many of these houses came within the meaning of the Acts; but since the passing of the Nuisances Removal Act, 18 & 19 Vict. c. 121, this has been remedied.

WISBEACH.

Wisbeach.

Mr. Jackson, town-clerk, and clerk to the Local Board, reports that previous to the Common Lodging House Act coming into operation, in 1851, the houses, as appear from the inspector's report at the time, were, with one exception, in a most filthy and unhealthy condition, and in point of construction more or less unsuitable. There have been few, if any, complaints against the registered lodging-houses, since the Act has been put into operation; no fever, or other infectious disease; and the management, class, number, and health of the inmates of these houses have been materially improved.

WORKSOP.

Worksop.

Mr. Wilcockson, clerk to the Local Board, reports that in Worksop there are ten registered houses, capable of accommodating 159 persons. That they are always full in harvest time, from the influx of Irish and labourers; but at other times not generally full, and hawkers, vagrants, &c., are then the inmates. That great improvement has taken place in the cleanliness and order of the rooms, since the Act came into operation. That the regulations are now more popular than they were at first, and they have produced a good effect upon the health and habits of occupants of this class of houses.

YORK.

York.

Mr. Henry Richardson, clerk to the Local Board of Health, states that shortly after the Public Health Act, 1848, was applied to this city, the Local Board formed bye-laws for the regulation of the common lodging-houses, which have been acted upon, and found fully to answer the expectation of the Board. That there has been a very decided improvement in this class of houses since they have been under the supervision of the Local Board, and they are in a satisfactory state.

Part II.
Provincial Districts.

TOWNS, DISTRICTS, &c., in which there are no Common Lodging Houses, or where the Acts have been so recently put in force that no Information as to their operation can be given.

Alvaston and Boulton.
Arnold.
*Baildon.
Barton, Eccles, Winton, and Monton.
Christchurch, near Newport.
Clapham (Sub-district).
Clevedon.
Croydon.
Diss.
Dover.
Eltham.
Garston.
Harrow.
Leamington.
Littlehampton.
†Llanllwchairn.
Newton Heath, near Manchester.
†Newtown.
Nuneaton.
Poulton-le-Sands.
Reading.
St. George, Hanover-square, part of.
St. Thomas, near Exeter.
Sandgate.
*Shipley.
Shirley.
Smethwich.
Street.
Toxteth Park.
Wallasey.
Wandsworth (District).
Wellingborough.
West Cowes.
West Ham.
Wilton.
Windhill.
Wisbeach.
Woolwich.

* Mr. Thompson, the clerk to these two Local Boards, includes them in one Return; as does Mr. Swain those marked (†).

COMMON LODGING HOUSES.

REPORTS
MADE TO THE
GENERAL BOARD OF HEALTH
ON
COMMON LODGING HOUSES.

(*Mr. Cowper.*)

Ordered, by The House of Commons, *to be Printed;*
22 *June* 1857.

119—Sess 2.

Under 8 oz.

HAINAULT FOREST.

RETURN to an Order of the Honourable The House of Commons,
dated 11 August 1857;—*for*,

EXTRACT "from the REPORT of the COMMISSIONERS of WOODS for the Year ending the 31st day of March 1857, containing a STATEMENT of the Proceedings adopted by the COMMISSIONERS of WOODS, &c., for bringing the CROWN'S HAINAULT ALLOTMENT into a State for Cultivation, including the undermentioned Accounts:

A Debtor and Creditor Account of the Forest of *Hainault*, during each of the last Five Years previous to the Date of the Act under which it was disafforested:

A Debtor and Creditor Account of the Allotment awarded to the Crown under the Act, for each Year since the Date of the Award to the 31st day of March last:

A Debtor and Creditor Account of the Commoners' Allotment from the Date of the Act to the latest Period, so far as it produced Income or caused Expenditure to the Crown:

(Each Account to be made out in sufficient Detail to make clear the specific Sources of Revenue to, and the specific Purposes of Expenditure by, the Crown, since the Date of the Act):"

"And, STATEMENT of the present Occupation and Extent of the CROWN ALLOTMENT; together with a Statement and Account of the present and prospective Rental derivable from the same."

HAINAULT ALLOTMENT.

IN the Report from the Commissioners of Woods, presented to Parliament in the year 1849, signed "Seymour, A. Milne, and Charles Gore," it was stated—

"There still remain three Forests, each having an hereditary Ranger, namely, "Whichwood, Whittlewood and Waltham (Epping or Hainault), for the improvement of which no legislative measures have as yet taken place.

* * * * * *

"For the improvement of the district called Hainault, or the 'King's "Woods,' we are not aware that we can suggest any better measures than those "contained in the Bill which passed the House of Commons in the year 1819.†

"By that Bill, two-thirds of the Land, of which the Soil and Timber are "the property of the Crown, were to have been allotted in fee in lieu of those "rights, and the remainder to the Lords of Manors and others, in compensation "for their rights."

* * * * * *

"In connexion with the subject of a division and inclosure of all or any of "the Forest Districts above referred to, we have only further to observe, that in "the Acts of Parliament which have been passed for the improvement of other

---

† This Bill was thrown out in the House of Lords.

" Royal Forests in charge of this Board, it has generally been expressly required " that all Lands allotted to the Crown should be appropriated to the growth of " Navy Timber.

" We are of opinion, that there should be no such restrictions as to the " allotments which may hereafter be obtained, but that they may be disposed " of and dealt with under the general powers and provisions of the existing law " for the general management of the Land Revenues of the Crown."

In accordance with the recommendation contained in the Report of the Commissioners of Woods in 1849, from which the foregoing Extracts are made, an Act was passed, in the Session of 1851, intituled, " An Act for disafforesting the Forest of Hainault, in the County of Essex."

In pursuance of the provisions of that Act, three Commissioners were appointed to adjudicate on the various Claims submitted to them; and on the 6th of November 1852 they executed an Award, by which an Allotment of 1,873 A. 0 R. 21 P. became the property of the Crown in severalty, freed and discharged from all claims.

For a period of six months after the execution of that Award, the Allotment was in the charge of the late Commissioner, Mr. Kennedy; and, from a perusal of the correspondence upon the subject, inserted in the Thirty-first Report* (1853), it will be seen, that although a suggestion was thrown out in a letter addressed by him to the Lords of the Treasury, on the 24th of March 1853, that a portion of the Allotment, comprising 451 acres, might be advantageously let for building purposes, no indication of a plan was made by him for its reclamation or future management.

In May 1853, the Allotment was placed in my charge. At that period, as stated in the Thirty-second Report (1854), there stood upon the Allotment, 24,714 Oak Trees, 3,377 Oak Pollards, and 86,679 Hornbeam Pollards, being upwards of 114,000 Trees in all, and in addition many portions of it were covered with a close growth of Underwood; on three sides the Land was uninclosed, and open to the Allotments set out to the Commoners, and the soil was saturated with wet to such a degree as to require the adoption of a system of Arterial as well as of Pipe Drainage before it could be profitably occupied for farming purposes.

In the case of an ordinary inclosure of common Land, the whole area subject to the operations of the inclosure is charged with the cost of forming the necessary Roads, and the owner of each Allotment is required to fence only a proportion of the Land awarded to him. In the present instance the Crown was required, by the terms of the disafforesting Act and of the Award, to construct a Fence, to inclose the Allotment set out to Her Majesty, and to fence it from the Roads, and to form about four miles of Public Road; and, in addition to these works, the whole cost of the construction of the Outfalls to the Arterial Drains was imposed upon the Crown, in consequence of the position of the Allotment, which was set out in the centre of a Forest of 3,000 Acres, the residue of which still remains an open common.

In May 1853, when, as before stated, the Allotment was transferred to my charge, although estimates had been framed for the construction of the Roads, Fences and Arterial Drains, the only portion of the works required by the disafforesting Act which had been commenced, was the preparation of the Timber for the Fences; but tenders were immediately obtained, as stated in the Thirty-second Report (1854), for the formation of the Roads and of the main Drains.

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* *Vide* Mr. Kennedy's Report for 1853, page 118, and Appendix, from page 203 to page 235.

These several works were commenced in August 1853, and the Contract was completed in October 1854. Their cost, as well as the expenses of the Disafforestation Commissioners and of their officers, have been defrayed under the provisions of the Act before referred to, out of a fund, which has arisen from the Sale of the Timber upon the portions of the Forest that were not allotted to the Crown. The balance to the credit of this fund, of which an Account is inserted in the Appendix, after defraying the expenses of some further works of trifling extent necessary to complete the Roads, is reserved, pursuant to the terms of the Act, in order to meet the sums required to compensate the Forest Officers, including the Lord Warden, whose claim, in consequence of litigation between the Earl of Mornington and Viscount Wellesley, by both of whom that office is claimed, has not yet been adjudicated upon.

While the several works required by the Act to be executed by the Crown, in the construction of the Public Roads and in the erection of Fences to inclose the Allotment awarded to Her Majesty, and to divide it from the Allotments set out to the commoners were in progress, the clearing of the Timber and Underwood upon the Crown Allotment was proceeded with, and attempts were made to let the Land for grazing purposes. Advertisements were also issued for the purpose of calling the attention of builders and speculators to the eligibility of a portion of the Allotment for the erection of Villa Residences; but the expectations which were entertained by Mr. Kennedy in that respect were not borne out by the results, no offer having been made to take any portion of the Allotment for building. I incline to the belief that the deficiency of water, and the situation of the Allotment at the east side of London, and its distance from a railway station, deterred speculators from making offers for the property, but it was nevertheless retained in hand for many months, in order that every facility might be afforded to persons desirous of taking building Leases, until it became evident to me that it was useless to retain this part of the Land uncleared, with a view to its appropriation for any purpose of that description. As regards the remainder of the Allotment, the offers received for renting it were so inadequate, that no doubt existed that it would be impossible to let any portion permanently at a fair rent, until it should have been cleared of the Timber, Pollards and Underwood, and the soil brought into a fit state for cultivation by a proper system of under-drainage.

The sale of the Oak Timber and Hornbeam Pollards was accordingly pressed forward with as much rapidity as possible, and within a period of one year, from May 1853, 280 acres were cleared of Timber and Pollards, and about 770 acres were cleared of Timber only.

For the under-drainage of the portions of the Land which had been cleared, arrangements were made with responsible tradesmen, who entered into contracts by which they undertook to purchase a large quantity of Stackwood and other produce, which would otherwise have been unsaleable, and to manufacture pipes for the drainage of the Estate, and also to cut and fill the drains, as well as to lay the pipes at certain specified prices.

These works were commenced in April 1855, and are now completed. Shortly after their commencement, an offer was made by Messrs. John and Alexander Alison, to take on lease a portion, containing 1,235 acres, or about two-thirds of the Allotment, for a term of 31 years, from the 10th October 1854, at the following rents; viz.:

	£.	s.	d.
For the first year of the term - - - -	309	–	–
„ second „ - - - - - -	618	–	–
„ residue „ - - - - - -	1,421	8	–

and upon the understanding that they should pay interest on all sums expended by the Crown in Drainage, and in the erection of Farm Buildings, at the rate of 5 and 6 per cent. respectively.

This offer was accepted, and in the first year of their tenancy, Messrs. Alison had 250 acres in cultivation, in addition to which, 700 acres were cleared by the Crown, and partly ploughed by the Lessees.

In the second year, ended at Michaelmas last (1856), the residue of the Land comprised in the letting was cleared by the Crown, and Messrs. Alison had 1,165 acres in cultivation, of which upwards of 600 acres were cropped with potatoes.

About a year after the agreement with Messrs. Alison for the letting of the larger portion of the Allotment had been completed, an application was made by Mr. John Alison, one of the Lessees, to take an additional portion of the Allotment, containing 554 A. 1 R. 11 P., comprising the Land which had been considered to be available for building purposes, but for which no offer had been received, and two small parcels of Land in the vicinity, formerly part of the waste of the Forest, containing 50 A. 2 R. 19 P. for a term of 30 years, from Michaelmas 1855, so as to expire at the same time as the former letting, and an agreement was accordingly entered into for that purpose, at the under-mentioned rents:

	£.	s.	d.
For the first year of the term - - - -	252	5	–
„ second „ - - - - - -	390	15	–
„ residue „ - - - - - -	1,196	5	–

The Lessee also agreed to pay interest, at the rate of 5 per cent., on all sums expended upon the under-drainage of the Land comprised in this further letting; but, under the terms of the agreement, the Crown undertook to erect, at its own cost, a homestead, overseer's house, and four cottages for labourers, and also to form an accommodation road, of one mile and a half in length.

Further lettings of small parcels of Land within the Forest boundaries have also been effected, by which means the whole of the Allotment, with the exception of some detached strips of Land, is now let, and under cultivation; and in the present year about 850 acres are under wheat, 580 acres under potatoes, 150 acres under oats, and the residue under other crops.

The reclamation of a property which, in the spring of 1853, comprised upwards of 1,850 acres of open Forest, has not been effected without a considerable outlay; but it is satisfactory to add, that the proceeds of the sales of Timber, &c. which stood upon the Allotment, have realized a sum more than sufficient to pay the whole of the expenses incurred in clearing and draining the Land, as well as in the erection of Buildings, and in otherwise preparing the Land for cultivation.

In the Thirty-first and Thirty-second Reports (1853 and 1854) will be found a detailed valuation made by Messrs. Clutton and Driver of the Oak and Hornbeam Timber and Pollards standing upon the Allotment at the date of the Award. That valuation amounted to £.36,749. 8., and the following Statement shows the result of the Sales which have been effected of the Timber and Pollards included in that valuation:—

	£.	s.	d.
Received for the sale of Oak Timber and Bark, and Hornbeam Pollards, including the Value of Timber used for Fences - - - - - -	43,813	5	11
Amount due by Purchasers of Oak Timber - - - - - - -	1,293	17	3
Value of Oak Timber still unsold, and of the Hornbeam Pollards sold and upon the ground - - - - - - - - - - - -	3,212	8	1
£.	48,319	11	3
Deduct,			
Cost of hewing Timber, stripping Bark, Commission, and expenses of Sales - - - - - - - - - - - - - -	2,085	4	1
Net Produce of the Oak and Hornbeam Timber and Pollards - £. (*Vide* Details in Schedules (A.) and (B.), pages 12 and 13.)	46,234	7	2

The works which have been undertaken by the Crown, and of which the cost will be defrayed out of the monies arising from the sale of the timber, which stood upon the Crown allotment, comprise—

1. The preparation of the Produce, and the clearing and grubbing of the Land, in order to render it fit for cultivation.
2. The Arterial Drainage and subdivision Fencing.
3. The Pipe Drainage.
4. The erection of the requisite Farm Buildings.
5. The construction of an accommodation Road.
6. Various works of maintenance.

1. The grubbing and clearing of the Land was a laborious undertaking, in consequence of the close growth of Timber Trees, Pollards and Underwood, and of the difficulty experienced in disposing of the large quantity of Pollard Wood, Roots and other produce, that was converted into Fagots, Cordwood or Charcoal, and was either brought to sale, as far as purchasers could be found, or used in the manufacture of Pipes for the drainage of the Allotment, and of which a considerable quantity still remains on hand.

The following Statement shows the Expenditure upon this service:—

	£.	s.	d.	£.	s.	d.
Total Outlay for converting Produce and grubbing Roots - - - Carting and piling the Produce, in order to clear the Land for cultivation Wages paid to Superintendent, Foremen, Constables, and Surveyor's Commission and Expenses - - - - - - - - -				15,586	–	10
Deduct,						
Receipts from Sales - - - - - - - - - - -	4,679	19	4			
Amount due by Purchasers, and Value of Produce still upon the ground - - - - - - - - -	4,781	17	7			
				9,461	16	11
Net Cost of clearing the Land and grubbing the Roots, being at the rate of about 3 *l.* 5 *s.* 6 *d.* per acre - - - £. (*Vide* Details in Schedules (C.) and (D.), pages 12 and 13.)				6,124	3	11

2. The Arterial Drainage and the subdivision Fencing were executed at a total cost, including the value of the Timber and the Surveyor's charges, of £. 3,332. 4. 6.

3. The Pipe Drainage has extended altogether over an area, including the two additional parcels of land, comprised in the letting to Mr. John Alison, of 1,886 acres. The work was originally undertaken upon the assumption that the Estate would be divided into mixed Farms of Arable, Pasture and Meadow Land. Messrs. Alison, however, subsequently made arrangements for cultivating the Land for the supply of Vegetables for the London Market, by which means, instead of a portion of it being kept in permanent pasture, as was originally intended, nearly the whole will be converted into arable and market-garden cultivation.

This change in the views of the Lessees led to their making a requisition for the execution of the Drainage at much closer intervals than had been originally intended; and as it has been found, by experience, that the practical advantages of deep draining at narrow intervals, in stiff retentive clays, like the soil of Hainault Forest, become more apparent in proportion as the intervals between the Drains are diminished, and as the Lessees had agreed to pay interest, at the rate of 5 per cent., upon all sums expended in Drainage, their request was complied with.

The original Estimate for the drainage, which did not contemplate the laying of Pipes at closer intervals than 30 feet, amounted to between £. 6 and £. 7 an acre; but for the reasons stated above, the Pipes in many places were laid at intervals of only 20 feet, and these causes, combined with the unusually short period of time in which the work was executed, and with the price of labour, owing to the vicinity of the Estate to the Metropolis, and to the cost of excavating the Drains in a soil intersected with roots, have raised the total cost of the drainage to the sum of £. 16,680. 17. 7., being at the rate of £. 8. 19. per acre.

Of this amount, the sum of £. 162. 2. 1. was expended upon the Drainage of a small portion of the Allotment, held under a Lease by Mr. Painter, at a rent which was fixed upon the understanding that the cost of Drainage was to be borne by the Crown. Upon the whole of the residue, amounting to £. 16,518. 15. 6., interest will be charged to the Lessees, at the rate of 5 per cent. per annum.

The following Statement shows the nature and extent of this work:—

Total Length of Drains, 196,684 rods, or 614¾ miles.
Number of Pipes used, 3,274,097.
The Depth of the Drains varies from 8 feet to 4 feet.

1¾ inch	-	2,714,436
2¼ „	-	200,649
3 „	-	165,462
4 „	-	94,393
5 „	-	63,950
6 „	-	28,917
8 „	-	2,700
Junction Pipes	-	3,590
TOTAL		3,274,097

4. The Farm Buildings were designed to meet as far as possible the views of the Lessees, and with special reference to the circumstance that the isolated position of the Farmsteads rendered it necessary that accommodation should be provided for a number of skilled labourers.

Upon the Land included in the letting to Messrs. J. & A. Alison, containing 1,235 acres, the Buildings comprise two distinct Homesteads.

The principal set contains a large Farm-house, Foreman's Residence, and Cottages for four Labourers; Stabling for 28 Horses; Wheelwright's Shop; and Cart and Cattle-shed, with large Granary over; large Barns, Engine and Boiler-house, &c. &c.

The second set contains Cottages for four Labourers; Stabling for 28 Horses; with large Barn and Cart-shed, with large Granary over it, &c.

The whole of these Buildings are completed; and the total outlay incurred in their erection, inclusive of the Architect's commission and expenses, is £. 10,250. 11., and the Lessees, as has been already stated, are under covenant to pay interest at the rate of 6 per cent. upon that outlay.

Upon the Land included in the letting to Mr. John Alison, containing 604 A. 3 R. 30 P., the Buildings comprise—

A Bailiff's House.

Cottages for four Labourers.

Stabling for 28 Horses, with Cart-shed, and other conveniences.

The total outlay upon these Buildings, including Architect's commission and expenses, will be £. 3,668. 7. 10.

No interest is payable by the Lessees upon the outlay last mentioned, as the rent of £. 1,196. 5. per annum was fixed upon the understanding that these Farm Premises and Houses should be constructed by the Crown, without the payment by the Lessee of any interest upon the expenditure.

The cost of the whole of the Buildings has amounted, upon an average, to £. 7. 11. 3. per acre.

5. In the letting to Messrs. J. and A. Alison, it was arranged that the Lessees should bear the expense of constructing such additional Fences and accommodation Roads as they might consider necessary; but in the subsequent letting of 604 A. 3. R. 30 P. to Mr. J. Alison, the Crown undertook the construction of a Farm-road, extending one mile and a half in length, at an estimated cost of £. 1,000.: an additional length of Road was subsequently formed at the request of the Lessee, by which means the cost was increased to £. 1,123. 10. 5., and the Lessee pays interest, at the rate of 5 per cent. per annum, upon £. 123. 10. 5., being the amount of the excess beyond the sum agreed to be laid out by the Crown upon the Road.

6. The works of maintenance upon the Allotment comprise the repairs of the Roads, Fences and Ditches before the lettings were completed. In consequence of the heavy traffic caused by the cartage of the Timber, and the drain pipes, &c., the maintenance of the Roads, Fences and Ditches has cost a sum of £. 312. 17. 2.; and there are various other charges payable by the Crown for miscellaneous services, amounting to £. 523. 1. 10½.

The general result of the disafforestation may be summed up in the following Statement.

In November 1852, a Forest of 3,000 acres in extent, from which, in consequence of the conflicting rights of the Crown, the hereditary Lord Warden, and the Commoners, but little profit had been derived, as will be seen by the account of the Receipt and Expenditure during the previous five years, inserted in the Appendix, p. 10, was disafforested, and the Crown received in compensation for its rights an Allotment of 1,873 acres of Land, available for letting.

The proceeds of the Timber felled from the Allotments awarded to the Commoners form a fund out of which all the expenses of the disafforestation, of the Roads across, and of the Boundary Fences round the Crown Allotment, have been paid; and after discharging some further claims of trifling amount, there will remain a balance of upwards of £.7,000, which is estimated to be sufficient to pay the compensation which may be awarded to the Lord Warden, as well as those which have already been granted to the other Forest Officers for the loss of their respective appointments.

The Crown Allotment, in May 1853, when it was placed in charge with me, was covered with 24,714 Oak Trees, 3,377 Oak Pollards, and 86,679 Hornbeam Pollards, being upwards of 114,000 Trees in all; and, in addition, many portions of it were covered with a close growth of Underwood.

In the space of three years and a half from the date of the award, the Timber upon this Allotment has been felled; and the Allotment, as well as 50 acres of Land adjoining, belonging to the Crown, has been fenced in, cleared, drained, and furnished with Roads and Farm Buildings, under the immediate superintendence of Mr. John Clutton, the Receiver for the County of Essex.

The cost of these works will be covered by the proceeds of the sales of the Timber and Underwood, as shown by the following Account; and, in addition to a surplus of £.4,000 to arise from those sales, the sum of upwards of £.5,250 will be derived from grazing and other rents, accruing due up to Michaelmas next, as shown by the Statement on the opposite page, from which date, when the whole of the works, in respect of which interest is charged to the Lessees, will be completed, the Crown will be in the receipt of a rental of £.4,248 per annum, which is equal to £.2. 4. 6. per acre.

Account of Receipt and Expenditure in the Clearing and Preparing for Cultivation the Crown Allotment in *Hainault Forest.*

	£.	s.	d.	£.	s.	d.	£.	s.	d.
Receipt:									
Gross Proceeds of the Sales, and Value of Oak and Hornbeam Timber and Pollards, &c.				48,319	11	3			
Deduct,									
Cost of hewing Timber, stripping Bark, Commission and Expenses of Sales				2,085	4	1			
Net Produce available to meet the under-mentioned Outlay - - - £.							46,234	7	2
Expenditure:									
1. Arterial Drainage and Sub-division Fencing				3,332	4	10			
2. Preparation of Produce, clearing and grubbing, gross Expenditure	15,586	–	10						
Deduct,									
Receipts from Sales and Value of Produce in hand	9,461	16	11						
Net Cost (equivalent to about 3 *l.* 5 *s.* 6 *d.* per acre)				6,124	3	11			
3. Pipe Drainage (equivalent to 8 *l.* 19 *s.* per acre)				16,680	17	7			
4. Farm Buildings and Labourers' Cottages (equivalent to 7 *l.* 11 *s.* 3 *d.* per acre)				13,918	18	10			
5. Accommodation Road				1,123	10	5			
6. Repairing Roads, Fences and Ditches, and miscellaneous Charges				835	19	1			
							42,015	14	8
Surplus - - - £.							4,218	12	6

STATEMENT showing the present Occupation and Extent of the Crown Allotment, and the RENTS Receivable from the Date of the Award (November 1852) to Michaelmas 1857, and also the RENTAL which will be Payable from the last-mentioned Date.

LESSEE or TENANT.	QUANTITY.	Nature of Tenure.		RECEIPTS from RENTS, &c., accruing in each Year, ended respectively at Michaelmas					RENTS payable from Michaelmas 1857.
		Term of Years.	Expires	1853.	1854.	1855.	1856.	1857.	
	A. R. P.			£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Grazing Rents, sundry Persons - - - - -	- - -	- -	- - -	18 12 9	312 1 -	14 6 7	—	—	—
Grazing Rents, Section S, (108 acres) John Cockshot	- - -	yearly	- - -	- -	- -	10 - -	—	—	—
Grazing Rents, Section T, (451 acres) George Hooper	- - -	ditto	- - -	- -	- -	100 - -	—	—	—
William Parish, Cottage -	- - -	ditto	- - -	3 5 -	9 15 -	3 5 -	6 10 -	6 10 -	6 10 -
Alexander Young, ditto -	- - -	ditto	- - -	2 10 -	7 10 -	2 10 -	- - Cottage pulled down	—	—
William Uffindell - -	5 0 0	ditto	- - -	- -	7 10 -	15 - -	15 - -	15 - -	15 - -
John Willis, assigned to John Alison - -	11 1 39	29	Michaelmas 1885	- -	11 10 -	11 10 -	23 - -	23 - -	23 - -
Alexander and John Alison -	1,235 3 23	31	- ditto -	- -	- -	309 - -	618 - -	1,421 8 -	1,421 8 -
Ditto, Interest upon outlay	- - -	- -	- - -	- -	- -	- -	318 6 11	968 5 5	1,165 3 2
John Cockshot - - -	13 3 1	31	- ditto -	- -	- -	28 - -	30 - -	47 11 1	47 11 1
George Painter - - -	31 1 23	21½	Michaelmas 1876	- -	- -	3 18 6	7 17 -	39 3 6	70 10 -
John Alison - - -	604 3 30	30	Michaelmas 1885	- -	- -	- -	252 5 -	390 15 -	1,196 5 -
Ditto, Interest upon outlay	- - -	- -	- - -	- -	- -	- -	- - -	75 16 9	277 8 3
A. and J. Alison, right of Way from the Lawn Farm	- - -	at will	- - -	- -	- -	- -	- 10 -	1 - -	1 - -
Thomas Scott, Royalty on Pipes, &c. - - -	- - -	- -	- - -	- -	- -	- -	68 15 -	11 5 -	—
John Fowler, jun. - -	- - -	5	Christmas 1861	- -	- -	- -	- - -	15 - -	15 - -
Thomas Briggs - - -	1 0 22	14	Michaelmas 1867	- -	1 - -	1 - -	1 - -	1 - -	—
John Willis - - -	4 1 36	14	- ditto -	- -	4 10 -	4 10 -	9 - -	9 - -	9 - -
	1,908 0 14		£.	24 7 9	353 16 -	503 - 1	1,350 3 11	3,024 14 9	

TOTAL RENTS, &c. accruing due up to Michaelmas 1857 - - - £. 5,256. 2. 6.

RENTAL from Michaelmas 1857 - - - - - - - £. 4,248 15 6

Note.—Part of the Land, containing about 50 acres, included in these Lettings, was formerly part of the open Waste of the Forest, and was the property of the Crown before the date of the Award.

APPENDIX.

HAINAULT FOREST.

A **Debtor** and **Creditor Account** of the Forest of *Hainault*, during each of the last Five

	Year ended 31 Mar. 1847.	Year ended 31 Mar. 1848.	Year ended 31 Mar. 1849.	Year ended 31 Mar. 1850.	Year ended 31 Mar. 1851.	—
RECEIPTS:	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
To Sales of Timber - - - - -	529 – –	771 7 6	594 7 6	684 13 –	564 2 6	
„ Bark - - - - -	231 13 3	207 13 9	73 11 –	547 16 10	225 1 –	
„ Cordwood and Fagots -	118 9 –	- -	149 7 3	- - -	85 4 6	
„ Gravel - - - - -	7 10 –	8 11 –	10 1 –	- - -	13 14 –	
To Miscellaneous - - - - - -	- - -	- -	12 12 –	17 17 –	6 6 –	
	886 12 3	987 12 3	839 18 9	1,250 6 10	894 8 –	4,858 18 1
					£.	4,858 18 1

A **Debtor** and **Creditor Account** of the **Allotment** Awarded to the **Crown** under Act

RECEIPTS.

	£. s. d.	£. s. d.
By Sales of Oak Timber and Bark, and Hornbeam Pollards, and Value of Produce on hand - - - - - - - - - - - - - - -	48,319 11 3	
(*Vide* Details in Schedule (A.), p. 12.)		
Less:		
Cost of hewing Timber, stripping Bark, and Expenses of Sales, &c. - - - - -	2,085 4 1	
(*Vide* Details in Schedule (B.), p. 13.)		
Net Proceeds of Sales of Oak Timber, &c. - - - - - - - - - - - -	- - -	46,234 7 2
	£.	46,234 7 2

APPENDIX.

HAINAULT FOREST.

Years, previous to the date of the Act (14 & 15 Vict. c. 43), under which it was Disafforested.

PAYMENTS:	Year ended 31 March 1847. £. s. d.	Year ended 31 Mar. 1848. £. s. d.	Year ended 31 Mar. 1849. £. s. d.	Year ended 31 March 1850. £. s. d.	Year ended 31 March 1851. £. s. d.	— £. s. d.
By Salary of Deputy Surveyor, &c.	33 6 –	39 16 –	40 9 –	43 8 –	47 6 –	
„ Preparation of Produce for Sale	174 14 9	300 3 3	141 7 9	241 18 1	213 17 11	
„ Expenses of Sales by Auction	16 11 –	18 9 –	15 14 6	16 1 6	16 15 6	
„ Salaries of Keepers	160 – –	160 – –	160 – –	160 – –	160 – –	
„ Money Payments in lieu of Fuel Assignments	38 – –	- -	76 – –	- - -	76 – –	
„ Surveys and Plans	- - -	- -	- -	17 3 5	—	
„ Law Charges	1 3 –	- -	- -	6 7 3	8 18 6	
£.	423 14 9	518 8 3	433 11 3	484 18 3	522 17 11	2,383 10 5
By Balance						2,475 7 8
£.						4,858 18 1

14 & 15 Vict. c. 43, for each Year since the Date of the Award, to the 31st of March 1857.

PAYMENTS.

	£. s. d.	£. s. d.
By Cost of preparing Produce for Sale, and clearing and grubbing the Land in order to render it fit for cultivation	15,586 – 10	
(*Vide* Details in Schedule (C.), p. 12)		
Less:		
Receipts derived from Sales of Cordwood, Stackwood and other Produce during the clearing of the Land (*Vide* Details in Schedule (D.), p. 13.)	9,461 16 11	
Net Cost	- - -	6,124 3 11
By the Arterial Drainage and Subdivision Fencing	3,332 4 10	
„ the Pipe Drainage	16,680 17 7	
„ the Farm-buildings and Labourers' Cottages	13,918 18 10	
„ an Accommodation Road	1,123 10 5	
„ Repairing Roads, Fences and Ditches, and miscellaneous Charges	835 19 1	
(*Vide* Details of these five Items of Expenditure in Schedule (E.), p. 14 and 15.)		35,891 10 9
TOTAL OUTLAY	£.	42,015 14 8
Surplus		4,218 12 6
	£.	46,234 7 2

CROWN ALLOTMENT, HAINAULT.

STATEMENTS showing the TOTAL RECEIPTS derived from the Sale of Timber, Cordwood and other Produce from the 6th of November 1852 (the date of the Award) to the 31st of March 1857, together with the Value of the Produce completing the Works in Progress.

SCHEDULE (A.)

STATEMENT showing the GROSS RECEIPT from Sales of Oak Timber and Bark, and of Hornbeam Pollards.

HEADS OF RECEIPT.	From 6 Nov. 1852 to 31 Mar. 1853.	Year ended 31 Mar. 1854.	Year ended 31 Mar. 1855.	Year ended 31 Mar. 1856.	Year ended 31 Mar. 1857.	TOTALS.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Sales of Oak Timber - - - - -	- -	7,317 15 6	11,002 11 6	9,292 8 –	12,799 18 –	43,813 5 11
„ Bark - - - - - -	- -	- -	706 17 6	330 15 6	416 9 –	
„ Hornbeam Pollards - - -	- -	171 1 6	549 16 8	28 19 8	898 14 1	
Interest paid by Purchasers - - -	- -	- -	- - -	15 6 2	14 15 10	
Miscellaneous Receipts - - -	- -	- -	7 2 6	39 9 6	—	
Value of Timber used in the preparation of the Boundary and Subdivision Fences	- -	- -	- - -	- - -	221 5 –	
TOTAL Amount of Sales to the 31st of March 1857 - - - - - -					- - £.	43,813 5 11
Amount due by Purchasers of Oak Timber, sold since 31 March 1857 - - - -					1,293 17 3	
Estimated Value of Oak Timber unsold, and still upon the ground - - - - - -					800 – –	
Apportioned Amount due by Purchasers of Hornbeam Pollards, and Estimated Value of those still unsold, and upon the ground - - - - - - - - - - - - -					2,412 8 1	4,506 5 4
TOTAL Amount of Sales, and Estimated Value of Produce still Unsold - - - £.						48,319 11 3

SCHEDULE (C.)

STATEMENT showing the GROSS EXPENDITURE incurred in the Preparation of Produce for Sale, and in Clearing and Grubbing the Land, in order to bring it into a fit State for Cultivation.

HEADS of EXPENDITURE.	From 6 Nov. 1852 to 31 Mar. 1853.	Year ended 31 Mar. 1854.	Year ended 31 Mar. 1855.	Year ended 31 March 1856.	Year ended 31 March 1857.	TOTAL.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Making Cordwood, and preparing other produce for Sale - - - - -	- -	387 15 3	2,076 10 4	5,059 17 10	648 12 –	15,586 – 10
Preparation and Conveyance to Woolwich of Produce sold to the War Department	- -	- -	- -	- - -	186 19 7	
Making-up, and grubbing Thorn Stack-wood, making Fagots and Bands, and preparing Charcoal - - - -	- -	38 16 10	43 1 11	397 7 3	488 4 8	
Grubbing Underwood and Bushes, and burning the unsaleable Produce -	- -	67 15 7	305 15 2	130 3 1	84 4 11	
Grubbing and preparing Oak Roots for Sale - - - - - - - -	- -	10 1 3	434 13 8	1,227 6 6	1,429 3 9	
Carting and piling the Produce on the Ground, in order to clear the Land for Cultivation - - - - - -	- -	- -	- -	457 17 9	887 16 8	
Discount allowed to Purchasers - -	- -	- -	46 13 4	—	—	
Attendance of Police Constables - -	- -	- -	111 16 –	66 17 6	67 1 –	
Salary and Expenses of Superintendent and Assistants - - - - - -	- -	49 2 6	72 4 10	245 19 5	254 1 11	
Surveyor's Charges, Commission and Expenses - - - - - -	- -	- -	105 – –	100 – –	105 – 4	
TOTAL Expenditure in preparing Produce and clearing and grubbing the Land - £.						15,586 – 10

- - - - - - - - CROWN ALLOTMENT, HAINAULT.

Allotment awarded to the Crown by the Commissioners for Disafforesting the Forest of *Hainault*, in each Year, from the on hand at the last mentioned date; also the Total Expenditure during the same Period, and the Estimated Cost of

Schedule (B.)

STATEMENT showing the Expenditure in connexion with the Sales of Timber and Bark, and of Hornbeam Pollards.

HEADS OF EXPENDITURE.	From 6 Nov. 1852 to 31 Mar. 1853.	Year ended 31 Mar. 1854.	Year ended 31 March 1855.	Year ended 31 March 1856.	Year ended 31 March 1857.	Totals.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Stripping and stacking Bark - -	- -	- -	380 6 10	184 14 5	130 11 11	2,085 4 1
Discount to Purchasers - - -	- -	- -	- - -	- - -	4 17 7	
Hewing Oak Timber purchased by the War Department, and conveying it to Woolwich - - - - - -	- -	- -	- - -	- - -	202 3 –	
Printing Catalogues, Advertisements, &c.	- -	11 9 8	32 9 5	30 8 6	21 7 4	
Receiver's Commission and Expenses -	- -	182 16 11	303 6 9	246 3 –	354 8 9	
Total Expenditure in connexion with the Sale of Timber and Bark - - - £.						2,085 4 1

Schedule (D.)

STATEMENT showing the Receipts derived from Sales of Cordwood, Stackwood, and other Produce during the Clearing and Grubbing of the Land.

HEADS of RECEIPTS.	From 6 Nov. 1852 to 31 Mar. 1853.	Year ended 31 Mar. 1854.	Year ended 31 Mar. 1855.	Year ended 31 March 1856.	Year ended 31 March 1857.	TOTALS.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Sales of Cordwood, Skittlewood, Charcoal, Fagots, and other Produce - - -	- -	96 9 8	374 15 8	1,251 3 6	2,636 9 5	4,679 19 4
Sales of Oak Rootwood - - - -	- -	37 16 6	48 – 6	22 19 3	133 3 –	
Sales of Miscellaneous Produce - -	- -	36 14 6	19 10 3	8 5 –	14 12 1	
Add,— Amount due by Purchasers, and estimated Value of Produce still upon the Ground - - - - - -						4,781 17 7
Total Receipts from Cordwood, and other Produce prepared for Sale, during the Process of clearing the Land - - - - - - - - - - - - £.						9,461 16 11

CROWN ALLOTMENT, HAINAULT—*continued.*

SCHEDULE (E.)

STATEMENT showing the EXPENDITURE in Drainage, Fencing, Buildings, and other Miscellaneous Services.

———	From 6 Nov. 1852 to 31 Mar. 1853.	Year ended 31 Mar. 1854.	Year ended 31 Mar. 1855.	Year ended 31 Mar. 1856.	Year ended 31 Mar. 1857.	—	—
The ARTERIAL DRAINAGE, and SUBDIVISION FENCING:	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Apportioned Amount of Contract with Mr. G. Siddons, applicable to the Construction of the Arterial Drains	- -	- -	- -	- - -	1,761 8 1		
Ditto, applicable to the Construction of a Reservoir -	- -	- -	- -	- - -	299 6 8		
Contract with Mr. J. Wood, for preparing and fixing Subdivision Fences - -	- -	- -	- -	- - -	612 16 5		
Purchase of Quick Plants, and labour in Planting, &c.	- -	47 15 –	- -	- - -	- - -		
Value of Timber supplied from the Crown Allotment for the Fences - - -	- -	- -	134 – –	- - -	75 3 –	3,332 4 10	
Purchase of Timber from Woolmer Forest, for the Fences, including the Cost of Conversion and Carriage - - - - -	- -	- -	114 – –	- - -	- - -		
Wages of Superintendent -	- -	- -	35 13 –	48 – –	- - -		
Miscellaneous Charges -	- -	13 3 –	- -	- - -	- - -		
Surveyor's Commission, and Expenses - - -	- -	- -	- -	188 19 8	- - -		
TOTAL COST of the ARTERIAL DRAINAGE and SUBDIVISION FENCING - - -						- - -	3,332 4 10
The PIPE DRAINAGE:							
Payments to Contractors for excavating Drains, manufacturing and laying Pipes, &c. - - - - -	- -	- -	118 4 8	2,983 10 11	9,524 4 6		
Wages of Superintendent, and Day Labour - -	- -	- -	36 9 –	109 10 6	111 11 –	13,288 – 1	
Surveyor's Commission and Expenses - - -	- -	- -	- -	- - -	404 9 6		
Add,—Payments made since the 31st March 1857, and estimated Balances due to Contractor, Surveyor, &c. - - - - - - - - - - - - - -						3,392 17 6	
TOTAL COST of the PIPE DRAINAGE - - -							16,680 17 7
The ERECTION of FARM BUILDINGS and LABOURERS' COTTAGES:							
Payments to Contractors for the erection of the two sets of Farm Buildings, specified at p. 6 and 7, on the portion of the Allotment containing 1,236 acres, let to Messrs. J. & A. Alison - -	- -	- -	- -	6,700 – –	2,872 15 –		
Various additions - -	- -	- -	- -	39 11 10	47 15 6		
Salary of Clerk of the Works	- -	- -	- -	73 10 –	25 9 –		
Surveyor's Commission and Expenses - - -	- -	- -	- -	- - -	491 9 8	13,550 11 –	
Allowance to Mr. John Alison, for the erection by him of the Buildings specified at p. 7, on the portion of the Allotment, &c. containing 604 acres, let to him (on account) - - - -	- -	- -	- -	- - -	3,300 – –		
Add,—Payments made since the 31st March 1857, and Balance still due - -						368 7 10	
TOTAL COST of the BUILDINGS						- - -	13,918 18 10
Carried forward - -							33,932 1 3

CROWN ALLOTMENTS, HAINAULT—SCHEDULE (E.)—*continued.*

	From 6 Nov. 1852 to 31 Mar. 1853.	Year ended 31 Mar. 1854.	Year ended 31 Mar. 1855.	Year ended 31 Mar. 1856.	Year ended 31 Mar. 1857.	—	—
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Brought forward - -	- -	- -	- -	- - -	- - -	- - -	33,932 1 3
THE CONSTRUCTION of an ACCOMMODATION ROAD:							
Day-labour and Materials used in the Construction of a Road of One Mile and Five Furlongs in length -	- -	- -	- -	- - -	1,065 14 9	1,123 10 5	
Surveyor's Commission and Expenses - - -	- -	- -	- -	- - -	57 15 8		
				TOTAL COST of the ROAD	- - -	£.	1,123 10 5
REPAIRING ROADS, FENCES and DITCHES, and MISCELLANEOUS SERVICES:							
Repairs of Roads - -	- -	- -	- -	198 – 4	11 11 1	835 19 1	
Repairs of Fences - -	- -	3 7 9	1 11 1	47 19 3	50 7 9		
Levelling Gravel-pits - -	- -	- -	- -	8 1 7	94 13 8		
Purchase of Quick Plants not required for the Fences, but since used for Repairs or re-sold - - - - -	- -	- -	37 2 6	- - -	- - -		
Trenching the Ground and rearing Quicks - -	- -	1 – 8	59 16 8	9 3 4	5 12 4		
Repairs of Hoghill House -	- -	58 9 6	- -	- - -	- - -		
Surveyor's Charges for various Services - -	- -	10 10 –	87 6 8	62 7 –	- - -		
Miscellaneous Charges -	- -	16 9 11	63 – 2	9 7 10	- - -		
		TOTAL COST of Repairing ROADS, FENCES, &c.			- - -	£.	835 19 1
		TOTAL EXPENDITURE in DRAINAGE, FENCING, BUILDING, and other MISCELLANEOUS SERVICES - - - - - - - - -				- £.	35,891 10 9

COMMONERS', &c., ALLOTMENTS, HAINAULT. - - - - - - - -

A DEBTOR and CREDITOR ACCOUNT of the COMMONERS' ALLOTMENTS from the Date of the Act

RECEIPTS.

	£.	s.	d.	£.	s.	d.
To Sales of the under-mentioned Produce from the Allotments awarded to the Commoners, and to Sir Charles Hulse; viz.:						
Oak Timber (Commoners' Allotment) - - - - - - - - - - - - -	17,879	13	–			
Ditto - (Sir Charles Hulse's Allotment) - - - - - - - - - -	1,990	2	–			
Bark -	562	–	3			
Cordwood or Stackwood - - - - - - - - - - - - - -	48	11	6			
Fagots or Bavins - - - - - - - - - - - - - - - - -	94	4	8			
Miscellaneous, Wood, &c. - - - - - - - - - - - - - -	32	–	5			
Other Receipts - - - - - - - - - - - - - - - - -	14	16	6			
				20,621	8	4
Estimated Value of the Timber used in the preparation of the Boundary and internal Fences (368 Loads, at 2 *l.* 10 *s.* per Load) - - - - - - - - - -	-	-	-	920	–	–
			£.	21,541	8	4

Note.—The Residue of the Timber required for the Fences was supplied, partly from the Crown Allotment, and partly from Woolmer Forest.

Office of Woods, &c.
13 August 1857.

- - - - - - - COMMONERS', &c., ALLOTMENTS, HAINAULT.

to the latest Period, so far as it produced Income, or caused Expenditure by The Crown.

PAYMENTS.

	£.	s.	d.	£.	s.	d.
By Remuneration and Allowances of the Disafforestation Commissioners appointed under the Act, and of their Officers, viz.:						
Personal Allowance to the three Commissioners - - - - - - - -	1,000	–	–			
Salary of their Clerk (at 200 *l.* per annum from 6th September 1851 to 20th January 1853) - - - - - - - - - - - - - - -	275	11	1			
Charges of their Surveyor for mapping the King's Woods - - - - - -	450	–	–			
Charges of their Valuer - - - - - - - - - - - - - - - -	209	7	6			
Printing, Advertising, Hotel, Travelling, and other Expenses of the Disafforestation Commissioners - - - - - - - - - - - - - - -	282	17	2			
				2,217	15	9
By Compensations payable under the 8th and 14th Sections of the Act, viz.:						
Purchase of Stock, pursuant to a Certificate of the Disafforestation Commissioners, in satisfaction of the Claims of the Poor Widows of the Parishes of Barking and Dagenham to Allowances of Fuel Wood - - - - - - - - -	500	–	–			
Allowances awarded by the Lords of the Treasury to the Keepers, upon the abolition of their Offices - - - - - - - - - - - - - - -	487	16	9			
				987	16	9
By Expenses incurred by the Commissioners of Woods, under the 7th and subsequent Sections of the Act, viz.:						
Surveyor's Bills for Valuation of the Crown's Forestal and other Rights, and for attendances at the Perambulation of the Boundaries, and before the Disafforestation Commissioners, for the purpose of supporting the Claim of the Crown to an adequate Allotment - - - - - - - - - - - - - - -	634	16	1			
Surveyor's Bills for Valuation and Sale of Timber, &c., viz.:						
Valuing the Timber on Sir Charles Hulse's Allotment (1,990 *l.* at 2 *l.* 10 *s.* per cent.)	49	14	9			
Selling - - ditto - - including various Expenses incidental to the Sale of Bark	115	1	4			
Valuing, marking, lotting, advertising, and selling the Timber, &c. on the Commoners' Allotment, 18,015 *l.* 10 *s.* at 5 *l.* per cent. - - - - - - £.900 15 6						
Refreshments at Sale, and other Expenses - - - - - - 25 1 9						
	925	17	3			
Valuing the Timber, &c., on the proposed Crown Allotment, in Sections, with Statements of the Number of Trees upon each Section, distinguishing Oak Timber from Hornbeam Pollards or other Trees (36,749 *l.* 8 *s.* at 2 *l.* 10 *s.* per cent.) -	918	14	6			
Various Miscellaneous Surveys and Reports - - - - - - - - - -	18	11	6			
Superintendent's Wages and Allowances - - - - - - - - - -	139	10	11			
Attendance of Police Constables employed to prevent Depredation - - - - -	311	2	–			
Preparation of Produce for Sale, &c. - - - - - - - - - -	434	16	9			
Law Charges and other Expenses - - - - - - - - - - - -	384	1	5			
				3,932	6	6
By Expenses incurred in the construction of Boundary Fences to the Crown Allotment, pursuant to the 13th Section of the Act:						
Proportion of the Contract with Mr. J. Wood, applicable to the preparation and fixing of the Boundary Fences - - - - - - - - - - - - -	1,577	9	9			
Proportion of the Contract with Mr. G. Siddons, applicable to the formation of Boundary Ditches - - - - - - - - - - - - - - - -	312	3	2			
Apportioned Cost of digging Boundary Ditches by Day Labour - - - - -	46	6	7			
Apportioned Cost of trenching the Ground, and of planting and weeding Quicks -	134	16	–			
Estimated Value of Timber supplied by the Crown, viz.:						
From the Crown, and Commoners' Allotments - - - - - £.932 2 –						
From Woolmer Forest - - - - - - - - - - 134 – –						
	1,066	2	–			
Apportioned Amount of Wages, &c. of Superintendent - - - - - - -	86	3	–			
Ditto - - - - - - Surveyor's Commission and Expenses - - - - - -	194	16	10			
				3,417	17	4
By Expenses incurred, pursuant to the 18th Section of the Act, in the formation of the Public Roads set out by the Disafforestation Commissioners:						
Proportion of Contract with Mr. G. Siddons, applicable to the construction of 327 chains of Road - - - - - - - - - - - - - - - -	2,722	10	1			
Allowance to Chadwell Ward, for re-making part of the Road - - - - - -	180	–	–			
Re-making other parts of the Road by Day Labour - - - - - - - -	197	12	1			
Inspection by the Surveyor of the Metropolis Roads Commissioners - - - - -	14	18	6			
Expenses of Proceedings before the Magistrates at Ilford, in reference to the liability of the Parish of Dagenham to the Repair of part of the Road, and of subsequent Arbitration - - - - - - - - - - - - - - - -	105	8	10			
Apportioned Cost of Advertisements for Tenders - - - - - - - - -	15	5	5			
Cost of a Level - - - - - - - - - - - - - - - - -	5	16	–			
Apportioned Amount of Wages, &c. of Superintendent - - - - - - - -	75	14	–			
Ditto - - - - of Surveyor's Commission and Expenses - - - - - -	170	9	9			
				3,487	14	8
				14,043	11	–
By Balance on the 31st of March 1857, reserved pursuant to the provisions of the Act to provide Compensation for the Forest Officers, including the Lord Warden, whose Claim has not yet been adjudicated upon, under the circumstances detailed at page 3 - - - - - - -				7,497	17	4
£.				21,541	8	4

CHARLES GORE,
Commissioner of Woods, Forests and Land Revenues.

HAINAULT FOREST.

EXTRACT from the Report of the Commissioners of Woods for the Year ending the 31st day of March 1857, containing a Statement of the Proceedings adopted by the Commissioners of Woods, &c., for bringing the Crown's Hainault Allotment into a State for Cultivation, &c.

(*Mr. Wilson.*)

Ordered, by The House of Commons, *to be Printed,*
13 *August* 1857.

264—Sess. 2.

Under 3 *oz.*

HAMPTON COURT AND KEW GARDENS.

RETURN to an Address of the Honourable The House of Commons,
dated 31 July 1857;—*for*,

A "RETURN of the NUMBER of VISITORS admitted to see the APARTMENTS and PICTURES at HAMPTON COURT, and the GARDENS at KEW, during the Year 1856; distinguishing the Number in each Month, and the Number on the several Sundays (in continuation of Parliamentary Paper, No. 401, of Session 1856)."

(*Sir George Brooke Pechell.*)

Ordered, by The House of Commons, *to be Printed,*
25 *August* 1857.

RETURN of the Number of VISITORS admitted to see the APARTMENTS and PICTURES at HAMPTON COURT, and the GARDENS at KEW, during the Year 1856; distinguishing the Number in each Month, and the Number on the several Sundays (in continuation of Parliamentary Paper, No. 401, of Session 1856.)

HAMPTON COURT PALACE.

SUNDAYS.	Number.	TOTAL NUMBER: On Sundays.	TOTAL NUMBER: Other Days.	TOTAL Number in each Month.
6 January - - - - - -	106	471	1,270	1,741
13 " - - - - - -	109			
20 " - - - - - -	102			
27 " - - - - - -	154			
3 February - - - - - -	227	912	1,087	1,999
10 " - - - - - -	176			
17 " - - - - - -	221			
24 " - - - - - -	288			
2 March - - - - - -	302	1,988	2,994	4,982
9 " - - - - - -	293			
16 " - - - - - -	234			
23 " - - - - - -	661			
30 " - - - - - -	498			
6 April - - - - - -	492	2,173	3,300	5,473
13 " - - - - - -	806			
20 " - - - - - -	679			
27 " - - - - - -	196			
4 May - - - - - -	855	5,359	13,462	18,821
11 " - - - - - -	2,046			
18 " - - - - - -	446			
25 " - - - - - -	2,012			
1 June - - - - - -	1,364	10,906	17,877	28,783
8 " - - - - - -	2,426			
15 " - - - - - -	1,992			
22 " - - - - - -	1,744			
29 " - - - - - -	3,380			
6 July - - - - - -	2,654	9,871	27,884	37,755
13 " - - - - - -	2,305			
20 " - - - - - -	1,977			
27 " - - - - - -	2,935			
3 August - - - - - -	2,635	10,418	21,636	32,054
10 " - - - - - -	2,123			
17 " - - - - - -	764			
24 " - - - - - -	2,440			
31 " - - - - - -	2,456			
7 September - - - - -	2,250	6,328	14,414	20,742
14 " - - - - - -	2,110			
21 " - - - - - -	1,706			
28 " - - - - - -	262			
5 October - - - - - -	288	1,575	3,604	5,179
12 " - - - - - -	342			
19 " - - - - - -	481			
26 " - - - - - -	464			
2 November - - - - -	293	1,242	1,442	2,684
9 " - - - - - -	266			
16 " - - - - - -	243			
23 " - - - - - -	262			
30 " - - - - - -	178			
7 December - - - - -	85	462	1,089	1,551
14 " - - - - - -	159			
21 " - - - - - -	127			
28 " - - - - - -	91			
	TOTAL - -	51,705	110,059	161,764

KEW GARDENS.

SUNDAYS.	Number.	TOTAL NUMBER:		TOTAL Number in each Month.
		On Sundays.	Other Days.	
6 January	44	317	1,129	1,446
13 „	76			
20 „	87			
27 „	110			
3 February	270	1,295	1,523	2,818
10 „	368			
17 „	182			
24 „	475			
2 March	374	4,075	4,649	8,724
9 „	347			
16 „	284			
23 „	1,524			
30 „	1,546			
6 April	768	5,421	4,691	10,112
13 „	2,189			
20 „	2,410			
27 „	54			
4 May	2,241	14,011	14,959	28,970
11 „	6,248			
18 „	437			
25 „	5,085			
1 June	3,500	40,414	36,608	77,022
8 „	10,453			
15 „	10,849			
22 „	5,221			
29 „	10,891			
6 July	12,375	40,318	41,298	81,616
13 „	11,847			
20 „	8,995			
27 „	7,101			
3 Augus	12,957	41,785	31,664	73,449
10 „	10,547			
17 „	782			
24 „	5,857			
31 „	11,642			
7 September	10,100	25,802	24,911	50,713
14 „	9,443			
21 „	5,962			
28 „	297			
5 October	468	2,080	3,837	5,917
12 „	572			
19 „	628			
26 „	412			
2 November	223	1,059	1,062	2,121
9 „	192			
16 „	316			
23 „	213			
30 „	115			
7 December	102	375	857	1,232
14 „	124			
21 „	75			
28 „	74			
		176,952	167,188	344,140

Office of Works, &c.,
21 August 1857.

B. Hall,
First Commissioner of Her Majesty's Works
and Public Buildings.

HAMPTON COURT AND KEW GARDENS.

RETURN of the Number of Visitors admitted to see the Apartments and Pictures at Hampton Court, and the Gardens at Kew, during the Year 1856; distinguishing the Number in each Month, and the Number on the several Sundays (in continuation of Parliamentary Paper, No. 401, of Session 1856).

(Sir George Brooke Pechell.)

Ordered, by The House of Commons, *to be Printed,*
25 *August* 1857.

318—Sess. 2.

Under 1 *oz.*

METROPOLITAN BOARD OF WORKS.

REPORT of the METROPOLITAN BOARD of WORKS, pursuant to the 18th and 19th Vict. cap. 120, s. 200.

1, Greek Street, Soho,
30 June 1857.

IN compliance with the direction contained in the 200th section of the Act for the better Local Management of the Metropolis, 18 and 19 Vict. c. 120, the Board now submit a Report of their proceedings in the execution of that Act.

It will be convenient, in the first place, briefly to advert to the duties which by law devolve upon the Board. Among the more prominent of these is that of designing and carrying out the main intercepting drainage of London, in pursuance of the 135th section, which enacts, that the Board "shall make such sewers and works as they may think necessary, for preventing all or any part of the Sewage within the Metropolis from flowing or passing into the River Thames in or near the Metropolis." And by the same section, they are required to cause such sewers and works to be completed on or before the 31st day of December 1860. By the 136th section, before commencing any works directed to the above object, they are required to submit the plan of the intended sewers and works, together with an estimate of the cost of carrying the same into execution, to the Commissioners of Her Majesty's Works and Public Buildings; and it is provided, that no such plan shall be carried into effect until the same has been approved by those Commissioners. The 135th section vests in the Board all the main sewers previously vested in the Metropolitan Commissioners of Sewers and the Commissioners of Sewers of the City of London." These are enumerated in a Schedule to the Act, and their aggregate length is 166 miles, of which 106 miles are to the north, and 60 south of the Thames. By the 137th and 138th sections, the Board are authorised to make orders declaring sewers, other than those specified in the Schedule, to be main sewers; and for the purpose of maintaining the main and general sewerage of the metropolis, they may make general or special orders for the guidance and direction of Vestries and District Boards, in their proceedings in relation to sewerage; and a subsequent section contains various subsidiary powers directed to the same end.

In furtherance of this object, namely, the preservation of a uniform system of metropolitan sewerage, the 69th section makes it incumbent upon all vestries and district boards to apply for and obtain the approval of the Board before proceeding to construct new sewers in their parishes or districts. The 202d section empowers the Board to make and enforce bye-laws for the purpose, amongst other things, of regulating the dimensions of pipes, drains, &c., and other means of communicating with sewers, and for regulating cleansing and other operations. And, by the 211th section, the Committee of Appeal appointed by the Board is directed to hear and determine appeals by parties who may deem themselves aggrieved by orders or acts of vestries and district boards in relation to the construction, repair, filling up, &c., of sewers, drains and buildings, and on other matters, the subject of their jurisdiction. The Board are also authorised to make bye-laws for regulating the plans, level, width, surface inclination, and the material of the pavements and roadway of new streets and roads, and the plans and level of building sites.

In addition to the foregoing powers, having reference to proceedings appertaining to sewerage and drainage, the 144th section enables the Board to make, widen, or improve streets, or roads, for facilitating the passage and traffic between different parts of the metropolis, and authorises them, in case they require further powers, to apply to Parliament to enable them to carry out works

works for the improvement of the metropolis or public benefit of its inhabitants; and the powers given by this section are, by the Amending Act of last Session, the 19th and 20th Victoria, c. 112, declared to extend to applications for providing parks, pleasure grounds, places of recreation, and open spaces. The 143d section renders the written consent of the Board necessary for the erection of any building beyond the regular line. The 141st section of the Act contains provisions with respect to the naming and numbering of streets; and by the 142d section the Board are required to keep a register showing any alterations in the names of streets, which may be introduced in pursuance of these provisions. By the 213th section the Board are enabled to order the payment of retiring pensions or allowances to persons who were employed by the late Metropolitan Commissioners of Sewers; and by the 214th section it is enacted, that no award by a vestry or district board, in respect of loss of emoluments arising from the passing of the Act by any person employed by any of the late paving boards, shall be final until confirmed by the Metropolitan Board; and an appeal to the Board is given to any of those parties whose claims for compensation may have been rejected by vestries or district boards.

The 180th section, which directs the raising of monies by vestries and district boards, for discharging debts and liabilities charged upon rates and assessments authorised to be raised under paving and improvement Acts, makes it incumbent upon the Board, where those debts and liabilities are charged upon rates not wholly levied in any one parish or district, to apportion such debts and liabilities between the parishes and districts concerned. By the 140th section, the Board are empowered, where they deem it right, to place any line of street situate in more than one parish or district, under the exclusive management of one vestry or district board, for all or any of the purposes of the Act; and the 192d section enables them, under the circumstances there stated, to alter the time for making and collecting rates in parishes, and the period for which rates may be made. The Board are, by the 147th and 182d sections, charged with the duty of levying and recovering certain rates and monies due to the Metropolitan Commissioners of Sewers; and, by the 181st section, they are directed to raise monies required for payment of mortgages, annuities, securities, debts, and liabilities, charged upon the several districts of the metropolis, at or immediately before the expiration of the Metropolitan Sewers Act.

In addition to the powers and duties which form the subject of the foregoing enumeration, the Board are appointed to superintend and carry out various important provisions of the Metropolitan Building Act, the 18 & 19 Vict., c. 122, the duties of the official referees having been abolished, and the Metropolitan Building Office discontinued. Their approval is made essential by the 56th section, before iron or other buildings, to which the rules of the Building Act are inapplicable, can be erected; and, in order to obtain such approval, it is necessary that there should be laid before the Board a plan of the proposed buildings, with such other particulars as may be required. They are, by the 59th section, empowered to prepare or sanction forms of various notices required by the Act; and the 26th section declares, that all copings, and architectural projections or decorations, eaves, or cornices to overhanging roofs, &c., except in the cases specified, shall be of fire-proof material, unless the Board otherwise permit, and provides that, with certain exceptions, no projection from any building shall extend beyond the general line of fronts in any street, except with the permission of the Board. By the 30th section, they are to determine disagreements between district surveyors and builders in relation to the rules of construction applicable to public buildings, such as churches, chapels, public concert-rooms, lecture-rooms, &c., a duty which, under the former Building Act, was performed by the official referees. The 32d section empowers the Board to alter the limits of districts,—to dismiss district surveyors, with the consent of the Secretary of State, or suspend them, and to appoint other surveyors in case of vacancies. By the 34th section, the situation of the offices of the several district surveyors must be approved by the Board. The 49th section purports to give a power to the Board to alter the scale of fees payable to the district surveyors; and, under the 50th and 78th sections, they may order fees in respect of special services. The 52d section directs the several district surveyors to make monthly returns to the Board of all notices of complaints, and their results, of works supervised, fees received, and special services performed in the exercise of their office, and other matters; and, by the 54th section, the superintending architect, appointed by the Board, is required to examine and report upon the returns of the district surveyors, and where any such return discloses any contravention of the Act, they are empowered to take such steps as they may consider the circumstances of the case require. By the 36th, and by subsequent sections, the Board are authorised in certain cases to appoint temporary substitutes for the performance of the duties of district surveyors. By the 55th section, they may, with the consent of the Queen in Council, alter the rules regulating the thickness of walls; and, by the 114th section, they are charged with the duty of awarding compensation to persons other than the official referees and registrars who were employed in the late Office of Metropolitan Buildings, and who may not have been employed by the Board, at a salary not less than that which they formerly enjoyed.

The Board now proceed to give a general exposition of the steps they have taken for carrying into effect the various duties imposed upon them by the Legislature. Immediately upon the Metropolis Local Management Act coming into operation, they were required to take possession of the property and securities of the Metropolitan Commissioners of Sewers, and of their records and documents; to make provision for the charge of all the main sewers of the metropolis, to re-engage sluice and flap-keepers, and to assume the supervision of the outlets both of main and local sewers. They had, moreover, to superintend the extensive contracts for works then in progress, and to furnish explanations to, and make various arrangements with, the local boards, necessarily attendant upon the introduction of a new system. These matters almost exclusively engaged the attention of the Board during its earlier meetings. They next proceeded to consider the organisation of their permanent establishment. In addition to the duties connected with sewerage and drainage, and to the general administrative functions vested in the Board by the Metropolis Local Management Act, it became necessary that they should make arrangements for the discharge of a new class of duties, viz., those created by the Building Act, by which the Building Office, with its establishment of officers, was discontinued. The Board devoted much time and attention to these important objects, and having appointed their staff of officers, they proceeded to make general regulations for the transaction of their business. The Bye-laws of the Board are annexed.

Main Drainage.

After the organisation of the establishment, the intercepting drainage was one of the earliest matters which engaged the attention of the Board, and, on the 8th February 1856, they instructed their engineer to report on the plans necessary for effecting the complete interception of the sewage of the metropolis. The engineer's report on the districts south of the Thames was presented on the 4th April 1856, and that on the drainage of the districts north of the Thames, on the 23d May in the same year. By the scheme then submitted, the outfall for the drainage, north of the river, was fixed at Barking Creek, and that for the south at a point in Plumstead Marshes, opposite that creek. On the 3d June the Board, in compliance with the direction in the Statute, submitted the plan for the drainage, south of the Thames, to the First Commissioner of Her Majesty's Works, which plan was subsequently returned to the Board by the First Commissioner on the ground that it failed to satisfy the requirements of the Metropolis Local Management Act; the outfall being in the parish of Plumstead, and, consequently, within the boundary of the metropolis, as defined by that Act. The copy of a Report by Captain Burstall on the flow of the tide was, at the same time, transmitted to the Board by the First Commissioner. Thereupon the Board resumed the consideration of the subject, and on the 22d October approved a plan for the drainage of the entire metropolis, and directed the same to be submitted to the Commissioners of Her Majesty's Works and Public Buildings, with an intimation that the Board had had under consideration other plans for discharging the sewage into the river below Gravesend, but that, as that extension would add between one and two millions to the outlay, and the expenditure would be incurred not to benefit the inhabitants of the metropolis, but to meet the wishes of persons residing on the banks of the river, the Board had declined to entertain these schemes; notwithstanding, if Her

Majesty's Government deemed such a scheme desirable, the Board would readily undertake the work, the Government providing for such additional outlay out of the National Revenue. On the 5th November they submitted this plan, with a copy of the resolution of the Board, to the First Commissioner.

This plan, which had for its object to provide improved outfalls for the drainage of the entire area, and, by interception, to relieve the Thames from pollution arising from the discharge of sewers into it, comprised a system of intercepting sewers, commencing at the western boundary of the metropolis and converging towards two main lines, having their outfalls below the metropolitan boundary, viz., at Halfway Reach. The First Commissioner of Her Majesty's Works, &c., in a letter presented to the Board on the 12th November, also returned this plan, withholding from it his approval, on the ground that he considered it at variance with the intentions of the Legislature, but he expressed his readiness, if the Board should desire it, to receive a deputation on the subject.

Accordingly, a deputation of the Board, on the 20th November, had an interview with the First Commissioner, who produced a Report by Captain Burstall, suggesting certain points of outfall for the intercepting drainage, which he considered would satisfy the requirements of the Metropolis Local Management Act in this respect; and the First Commissioner gave the deputation to understand, that if the Board would submit to him a plan adopting those points, he would be prepared to approve such plan so far as concerned the outfall. The result of this interview was reported on the 21st November. The Report of Captain Burstall was at the same time laid before the Board; and the engineer was instructed to prepare a plan, and report upon the points of discharge suggested in Captain Burstall's letter. That Report and plan were submitted to the Board on the 16th December, and on the 22d December the modified plan was again presented to the First Commissioner, whose decision upon it has not yet been received. Those outfalls involved an extension of the scheme five furlongs further eastward to Hornchurch Marsh on the north, and of one mile further eastward to a point in Erith Marshes on the south side of the Thames.

The main sewers, with their branches, comprise a total length of 81¼ miles, the area to be drained by them contains 101 square miles, and their total estimated cost is 2,836,601*l.* The First Commissioner, on the 31st of December 1856, referred the plan submitted by the Board to James Simpson, Esq. C. E., Thomas E. Blackwell, Esq., C. E., and Captain Douglas Galton, R. E., who still have it under investigation. For the preparation of these plans, involving a comparison of the relative merits of various outfalls, it became necessary to survey and design 150 miles of main sewers, to prepare detailed estimates of works amounting to not less than 8,000,000*l.*, to make borings, cross-sections, &c., and conduct various other operations, more particularly referred to in the annexed Report by the engineer of the Board.

Contracts in Progress at the determination of the Metropolitan Sewers Commission and Works of Sewerage.

Besides new contracts for sewerage works entered into by the Board, they were charged with the prosecution and completion of the numerous contracts for constructing sewers which were in progress, or had been entered into when the Metropolitan Sewers Commission expired, and comprised works distributed over 200 different streets and localities in the metropolis. The total cost of these works, with cleansing, repairs, &c., was 110,892*l.* 8*s.* 10*d.*, and they included amongst others, the formation of 18 miles of new sewers. The various localities in which the several works are executed, and other particulars, are stated in the engineer's Report, and the annexed Tables.

Construction of Sewers by Vestries, &c.

For the guidance of vestries and district Boards in the discharge of their duties as regards local sewerage, the Board supplied many of them with copies of plans, showing the sizes and levels of their sewers, and of other documents deposited in their office, and framed regulations respecting communications with main sewers, and other matters. Under the 69th section, which renders the previous approval of the Board necessary for the construction of new sewers by the local bodies, they have been called upon to consider numerous plans submitted by those bodies. The designs approved comprised 44¾ miles of sewers, at an approximate cost of upwards of 100,000 *l.*, which were examined and tested; and in deciding upon them the Board have had regard as well to the requirements of the particular district as to the conditions essential to a sound system of general drainage for the metropolis. The particulars of these last works appear in the table annexed to the engineer's Report. The officers of the Board have also, on application by vestries and district boards, superintended the formation of 660 connexions with main sewers for the purpose of drains, &c.

Loans on the Credit of Rates raised by Parishes and Districts.

Under that provision of the Act requiring the sanction of this Board before loans can be effected by vestries or district boards, for the purposes of the Act, there have been submitted to them various plans of sewers and other works intended to be executed in the several parishes and districts by moneys to be raised by loan; and the Board have, on the reports of their officers, considered and decided on the necessity for the works, and the propriety of the expenditure. The total amount of loans applicable to these objects sanctioned by the Board, up to the 25th March in the present year, was 34,700 *l.*

Examination and Repair of Main Sewers and Surveys.

A careful examination has been made of the condition of all the main sewers of the metropolis, and estimates have been prepared of the necessary works for putting them into an efficient state. Longitudinal and cross-sections, showing the construction of those sewers, have been prepared and lithographed for the information of the Board, as to the works which require to be executed, and copies of these documents have been furnished to the several vestries and district boards. A complete copy of the subterranean survey, occupying about 800 sheets of double elephant paper, has been made, the original sheets being much worn by constant use.

New Streets and Thoroughfares, Relief of Traffic, &c.

The Board have devoted much time and attention to means for relieving the overcrowded thoroughfares of the metropolis, and one of their first measures directed to this object was the projection of a new line of communication between the terminus of the South-Eastern Railway, near London Bridge, and the west-end of London. Parliament had already recognised the necessity of opening a new thoroughfare between Southwark and Westminster. By the 4 & 5 Vict. c. 12, the Commissioners of Her Majesty's Works and Public Buildings were authorised to advance a sum of 30,000 *l.* towards the expense of making and completing a line of street between those localities, already partly existing by way of Stamford-street. Under subsequent Acts of Parliament further sums have been appropriated to the same object, and have been invested in the purchase of Exchequer Bills. The total amount of Exchequer Bills applicable to this improvement was, on the 21st of April 1857, 89,100 *l.* The Board having directed the preparation of surveys and estimates, after careful investigation decided on applying to Parliament for powers to form a line of street, 3,330 feet in length, and 70 feet in width, commencing at a point in Blackfriars-road opposite the end of Stamford-street, and terminating in Wellington-street, in the borough, nearly opposite to the South-Eastern railway station. The total estimated outlay for effecting this improvement, comprising the purchase of property, the construction of sewers, paving, &c., is 519,424 *l.*, which sum, being reduced by the anticipated return from the re-sale of property, ground-rents, &c., and the above amount of Exchequer Bills, which will be handed over to this Board by the Commissioners of Her Majesty's Works, on the passing of the Street Improvements Act, leaves a net cost of 230,671 *l.*

In accordance with the direction in the Metropolis Management Act, the plan has been submitted to and approved by the First Commissioner of Her

Majesty's Works, &c.; and a Bill having been brought into Parliament for enabling the Board to effect this improvement, it was read a third time in the House of Commons on the 22d June last.

The Board, at the same time, took steps for opening another new thoroughfare, for the purpose of completing the line of communication between Coventry-street and Covent Garden, already partly formed under previous Acts of Parliament. The line adopted commences in St. Martin's-lane, at its intersection by Long Acre and Cranbourne-street, and proceeds thence in a south-easterly direction to the north-west end of King-street, Covent Garden; and the Board have included powers for forming this line in the same Bill with the Southwark Improvement. This latter street will be 135 yards in length, and 50 feet in width; the total estimated outlay amounts to 91,820 *l.*; and, after allowing for the return expected from the sale of ground-rents and old materials, and a contribution of 15,000 *l.* to be made by his Grace the Duke of Bedford, the net cost will be 30,020 *l.* The surplus, after payment of the principal and interest charged by certain Acts of Parliament on the fund known as "The London Bridge Approaches Fund," is, by the 13 and 14 Vict. c. 103, made applicable to the opening of this line of communication. In the Bill now before Parliament a provision has been inserted in Committee, limiting the amount to be charged on this fund towards the improvement in question, to a sum not exceeding 35,000 *l.* The Bill contains a provision empowering the Board to deal with the subsoil of the intended new streets, and enabling them to carry out, in the case of these thoroughfares, as examples of first and second-class streets, certain improvements in laying out the surface, and in the disposition of the private vaults, sewers, drains, gas and water pipes, telegraph wires, &c.; and the Board have offered premiums for the best designs directed to those objects which may be sent in.

The Board have been called upon to consider various other improvements in the street traffic of the metropolis, comprising, among others, the removal of the block of buildings known as Middle-row, Holborn; and have come to the conclusion, that it would be of great public advantage to remove the obstruction to traffic caused by those buildings. Plans and estimates have been prepared, and, as the estimated cost of the purchase of the property, including goodwills, &c. does not exceed 46,625 *l.*, it becomes unnecessary, under the Metropolis Local Management Act, to seek the approval of any other authority; and the architect and solicitor have been instructed to endeavour to effect conditional arrangements for the purchase of the property, in order, if practicable, to avoid the expense of an application to Parliament.

The formation of a new street, leading from the end of Old-street, St. Luke's, to New Oxford-street, has also engaged the attention of the Board, and a survey and detailed estimate of the cost of making the line are now in course of preparation, after which the consideration of the matter will be resumed. Application has been made to the Board with a view to the formation of a thoroughfare from Limehouse to Mile-end Old-town, by which an access to Victoria-park will be afforded, and a line of communication opened between Limehouse and a populous district in and near Hackney. This line of street has been referred by the Board to the Committee of Works and Improvements, who now have the subject under investigation. The formation of a short line of communication between the Commercial-road and Whitechapel has also been submitted to the Board, the object of which is to complete an improvement undertaken by Government some few years since. Under the powers given by the 144th section, to join with other parties in widening streets, the Board have agreed to contribute one-third of the cost of an improvement intended to be carried out by the vestry of Bermondsey, consisting in the widening of Fendall-street, in that parish; and have also consented to contribute a like proportion of the cost of removing an obstruction at the corner of Burr-street and East Smithfield, an improvement which will be carried out by the Board of Works for the Whitechapel district. Full details in connexion with these several measures are given in the annexed Report by the superintending architect.

As a further means of contributing to the relief of the traffic in the streets of the metropolis, the Board have considered how far it might be practicable to throw open Waterloo and Southwark Bridges to the public free of toll; and they have had some communications with the directors of the respective companies with the view of obtaining preliminary information as to the amount of tolls, and on other material points. The Board having learnt that the Corporation of the City of London had some time since been in negotiation for the purchase of Southwark Bridge, they opened a communication with the Corporation, with the view of ascertaining whether that body would be willing to purchase, or join in the purchase, of that bridge.

Embankment and Improvement of the Thames.

Two designs, one for the embankment and improvement of the Thames, of which Mr. Lionel Gisborne, C.E., is the author, and another for the formation of an embankment on the north side of the Thames, between Southwark and Westminster Bridges, and for the construction of a railway and other works, promoted by Messrs. Loder, Jackson and Bird, civil engineers, have been submitted to the Board, who referred them to the Committee of Works and Improvements. The Committee made a careful examination of those designs, receiving explanations in writing and by word of mouth from their promoters, and tested their relative merits with reference to the leading objects to which they considered that every measure of Thames embankment should be directed, namely, the improvement of the Thames as a navigable river, having regard [illegible] the safety of existing bridges; the increase of wharfage accommodation, and improved means for the shipment and delivery of goods; the improvement of the Thames in a sanitary point of view; the remedying of the present unsightly condition of the river bank, and the affording facilities, by means of architectural embellishment, for improving their appearance; the opening up of a new thoroughfare between the eastern and western parts of London; and the giving facilities for the construction of a low-level sewer. And the Committee having pointed out the leading features of the schemes, and explained the relative degree in which they considered them to have satisfied the above conditions, expressed the opinion that they had been prejudiced as works of public utility, by an endeavour to render them commercially remunerative; and that the public advantage should be the primary object in a work of such magnitude and of so peculiar a character as the embankment of the Thames. The Board agreed with the Committee in their conclusions on this subject, and passed a resolution to the effect that, inasmuch as the control of the banks of the Thames is vested in the Crown and the Corporation of London, or both, Her Majesty's Government and the Corporation of London be communicated with, to ascertain whether they will undertake to carry out the embankment of the Thames between Westminster and London Bridges, or if they will join the Board in carrying out that object.

Buildings in advance of General Line.

For many years past various legislative enactments have been framed for the purpose of repressing the undue narrowing of public thoroughfares, and the obstruction of light and air, by building upon forecourts and gardens in front of houses; and, by the 143d section of the Metropolis Management Act, no building can be erected beyond the regular line of buildings in the street without the consent, in writing, of this Board.

Reference may also here be conveniently made to a provision embodied in the 26th section of the Metropolitan Building Act, by which it is enacted that, with certain exceptions, no projections from any building shall extend beyond the general line of fronts in any street, except with the permission of the Board. The same section enacts that, except in certain cases, architectural projections or decorations, eaves, cornices, &c., shall be of fire-proof materials, unless the Board otherwise permit. The several localities to which applications under these enactments relate are in practice inspected and reported on by the officers, and before the Board decide upon them, they take care to acquaint themselves with the views of the vestries and boards of the several parishes and districts in which the premises are situate. Under the 143d section of the Metropolis Local Management Act, between 1st January 1856 and the 1st June 1857, there have been 277 cases, in 178 of which the Board have granted, and in 99 refused, the application. The applications partly under section 143 of the Metropolis Local Management Act, and partly under section 26 of the Building Act, were 65, of which 52 have been granted and 13 refused. The applications relative to the materials for eaves were 22 in number, and were all sanctioned.

The remedy for disobedience to the directions of the Board, in some of these cases, rests with the vestries and district boards, and in others with the district surveyors, and those remedies are, from various causes, by no means adequate for the due enforcement of the law. The nature of the difficulties experienced in carrying out these provisions of the Act is adverted to in the annexed Report by the superintending architect.

Naming and Numbering of Streets.

With respect to the naming and numbering of streets in the metropolis, the Board have been in commuication with the authorities of the General Post Office, with the view of determining the best mode of carrying out the provisions of the Act in relation to this matter, and have received from them much information and many valuable suggestions, and devised measures for remedying the inconveniences consequent upon the frequent repetition of the same names, and from irregularity of numbering.

The Board have had under consideration alterations of an extensive character, affecting a large number of streets and localities; but have deemed it expedient in the first instance to apply the proposed alterations on a more limited scale.

Amongst the more important of the improvements in this respect with which they intend to proceed is that applicable to the New-road, between Edgware-road and the Angel Inn, at Islington, by which that portion between Edgware-road and Osnaburgh-street will be called Marylebone-road; that between Osnaburgh-street and King's-cross, Euston-road; and that between King's-cross and the Angel, Pentonville-road; and all the separate names of places at present existing in that thoroughfare will be abolished. It is also proposed that the numbering of the houses in those roads should be consecutive throughout, commencing at the end nearest St. Paul's Cathedral, with the odd numbers on the left hand and the even numbers on the right. The proposed alteration of names has been submitted to, and has received the approval of the First Commissioner of Her Majesty's Works, &c., as required by the Act of Parliament. The Board contemplate a similar proceeding in Upper-street, Islington, between the Liverpool and Holloway-roads, and in other localities, by which the confusion caused by the irregularity of names and numbering will be remedied. The Board have served notices and taken other steps for amending the irregular numbering in Bloomsbury-square, and other places.

Buildings under Section 56 of the Building Act.

In exercise of the powers conferred upon them by the Building Act, the Board have framed general rules for the guidance of parties making application under the 56th section, for permission to erect iron buildings and other structures falling within the class designated in that enactment; and they have decided on numerous applications for leave to erect iron buildings for workshops, temporary churches, &c., and to build furnace chimney-shafts, floor cloth manufactories, and other structures. The total number of applications in respect of furnace chimney-shafts was 97, of which ten have been refused, and the remainder granted. The applications as to iron buildings have been 24, of which 18 have been granted and six refused. There have also been 71 cases of sheds, wooden buildings, &c., and of these 53 were granted and 18 refused.

Rules of Construction applicable to Public Buildings.

Five cases of disagreement have arisen between district surveyors and architects and builders, under the 30th section of the Building Act, relative to the construction of public buildings. Three of these were amicably adjusted; but in the other two the Board were called upon formally to decide the matter in issue between the parties.

Districts under the Building Act.

By the 32d section of the Building Act, the Board are empowered to alter the limits of the districts into which the metropolis is divided for the purposes of [illegible] Act. The limits being identical with those defined by the Metropolis Local Management Act, the districts of Hornsey and Tottenham were cut off from the metropolis, and as a consequence the former surveyors of those districts lost their offices, but they have been since appointed by the Board to other districts. On the other hand, localities were added to the metropolis not before included within in it, in consequence of which the Board formed three new districts, and surveyors were severally appointed to them, The districts thus formed were, Putney, including Roehampton, Plumstead with Eltham, and Penge. The Board have supplied two vacancies arising by death; one, in the district of St. Mary, Newington, the central division of Lambeth, and the northern division of Battersea, caused by the death of Mr. George Porter, and have appointed Mr. John Henry Taylor, late surveyor of Tottenham, as his successor; the other, in the case of the western division of the City of London, to which Mr. Rawlinson Parkinson has been appointed as successor to Mr. John Stevens, the late surveyor. From the possibility that claims of compensation might be set up, and in consequence of other difficulties in connexion with the alteration of districts and the modification of fees, the Board have hitherto confined themselves to the formation of new districts, without interfering with the limits of those previously existing.

Surveyors' Returns.

The duty pointed out by the 54th section of the Act, with reference to monthly returns by the district surveyors, of notices, complaints, works, services, fees, &c., has been punctually carried out, and those returns, comprising 168 separate accounts, received each month from those officers, have been examined by the superintending architect, and reported on, in accordance with the requirements of the Act.

Fees of District Surveyors.

The Board, considering that the operation of the Schedule to the Act, relative to the fees payable to the district surveyors, was anomalous and unsatisfactory, directed a revised table of fees to be prepared, the effect of which would have been that, whilst the public would have been benefited, no injurious interference with the interests of the district surveyors could have resulted, and they were desirous of bringing the revised scale into operation. But, upon consulting the then Attorney-General, Sir Alexander Cockburn, they were advised that as the law stood they had no power to introduce the proposed alterations. The consequence is, that the anomalies referred to still exist, and cannot be got rid of without the aid of Parliament; and in the ensuing Session it may be necessary to apply to Parliament for an alteration of the Building Act in this and in other respects. The Board have, in various instances, in compliance with the 50th section of the Act, appointed fees for special services performed by district surveyors under the first part of the Act, and also fees under the second part of the Act, for services in respect of dangerous structures to be paid to the surveyors respectively appointed by the Commissioners of Police of the metropolis, and by the Commissioners of Sewers of the City of London. The superintending architect's Report, which is annexed, describes the nature of those services, and contains a list showing the gross amount of fees received by the several district surveyors and their net income.

Parks and Open Spaces.

Memorials and applications from vestries and others were presented to the Board urging the importance, by reason of the increase of building, the difficulty of obtaining eligible sites, and on various other grounds, of their putting in force at the earliest practicable period the powers conferred upon them for the purchase of land for parks and places of recreation for the public. The subject was referred by the Board to the Committee of Works and Improvements, who, after conferring with various deputations and inspecting the several localities suggested as being adapted to the object in view, reported to the Board that it was, in their opinion, desirable for the better sanitary condition of the metropolis, and for facilitating the means of healthy recreation for the public, that parks should be established in certain localities which had hitherto been neglected in that respect, suggesting, on certain conditions with respect to contributions to the cost and other matters, the formation of parks in the south-eastern portion of the metropolis, between Bermondsey and Rotherhithe, and for Finsbury; and also expressing the opinion that it was desirable that Hampstead Heath should be purchased for the use of the public. The cost of the purchase of the sites considered eligible, and of forming the parks, &c., was estimated by the Committee at 100,000 *l.* for Bermondsey, and 200,000 *l.* for Finsbury, and the probable amount applicable to the Hampstead Heath purchase was stated at from 150,000 *l.* to 200,000 *l.* The Board thereupon resolved to take steps for the formation of two parks, one at Bermondsey and the other at Finsbury, and have since adopted certain proceedings in Parliament which, in their preliminary stages, had been promoted by inhabitants of Islington and other parishes, and they have since brought in a Bill for obtaining the necessary powers to enable them to make a park in that locality. That Bill was read a second time in the House of Commons on the 30th of June; the land described in the Bill, which comprises about 250 acres or thereabouts, is situate partly in the parish of Islington and partly in Hornsey, and lies to the west of the Green-lanes or Southgate-road.

Width and Formation of New Streets.

In consequence of an omission from the existing Building Act of a provision which was contained in the former, the Board found it necessary, shortly after the Metropolis Local Management Act came into operation, to exercise the power conferred upon them of passing a bye-law upon this subject. That bye-law has since been modified and extended, and has been approved by the Secretary of State, pursuant to the direction of the Act. It directs notice to be given to the Board, in all cases, of an intention to lay out new streets; prescribes a minimum width for streets intended for carriage and foot traffic; provides for the number and character of entrances to new streets; and for the rate of the curve or fall of the carriage-way, the height of the curb, and other matters, and prescribes penalties for any violation of these directions. The bye-law is set out at length in the superintending architect's Report.

Appointment of Deputies for District Surveyors, under Section 35 of the Building Act.

The Board have, under section 37, made 41 appointments of district surveyors, in cases in which the ordinary district surveyors have been engaged to act professionally in respect of works within their districts; and they have in four cases sanctioned the appointment of deputies, under section 35, where district surveyors have been prevented by illness or other causes from attending to the duties of their office.

Forms of Returns, Notices, &c., Sections 52 and 59 Building Act.

The Board have, conformably to the direction of the Act in this respect, framed and promulgated forms of returns by district surveyors, and notices by builders, district surveyors, building owners, adjoining owners, &c., which are now in general use.

Compensations and Retiring Allowances.

The provisions of the Metropolis Local Management Act having vested in the local boards many of the matters of detail which were heretofore conducted by the Sewers Commission, such as the collection of rates, the charge of local sewers, sluices, &c., a large body of persons were necessarily thrown out of employ. This being contemplated by the Legislature as a consequence of the altered administration of metropolitan local affairs, the Board were empowered by the 213th section of the Act, under certain circumstances, to grant retiring pensions to officers of the late Metropolitan Commissioners of Sewers.

They re-engaged the services of former officers, wherever that could be done, with a due regard to the public service; but, upon the change of system, numerous collectors, draughtsmen, labourers, &c., were unavoidably discharged. In the case of those who had been upon the establishment of the Sewers Commission, the Board deemed it their duty to avail themselves of the power given them to award compensation; and they did so, for the most part, by granting them annual allowances, varying in duration according to age, length of service, and other circumstances. The total number of persons thus compensated was 80, the highest amount awarded being in the case of a person now aged 71, 130 *l.* 10 *s.* per annum for life, and the lowest 10 *l.* for two years.

Some of those persons have since been re-engaged by this Board, or other public bodies, and their compensation is consequently suspended.

The 214th section of the Act, rendering it necessary that every award of compensation, in respect of loss of emoluments to officers of the former paving boards, should be submitted to the Metropolitan Board for confirmation, and also that any of those officers whose claims should be rejected by vestries and district boards might appeal to the Metropolitan Board, the total number of the awards by vestries and district boards that have come before this Board has been 228. Of these cases, 143 were the subject of appeal, and the awards were either confirmed or modified. In 73 of them the awards were confirmed without appeal, and 12 awards were altogether disallowed. In the majority of these cases the representatives of the vestries, &c. and the parties, or their counsel or solicitors, were in attendance, and a large demand was necessarily made upon the time of the Board by inquiries into the functions of former local bodies, and the statutes defining their duties and powers, and by an investigation of the merits of the various cases.

The Board have also, under the 114th section of the Building Act, had to deal with the claims of those officers who were employed in the late Office of Metropolitan Buildings, and have not been re-employed by this Board. In the performance of this duty they made awards of compensation to seven of those officers. On appeal to the Lords of the Treasury, the amount of compensation has, in some cases, been increased.

Apportionment of Debts and Liabilities of former Paving Boards.

The Board have had to decide upon several cases of apportionment of assets, debts, and liabilities of the former paving boards, under the 93d and 180th sections of the Metropolis Local Management Act, in cases in which debts and liabilities were charged upon rates to be levied in several parishes or districts, and in which the property of former bodies had to be divided. They have made an apportionment of the assets and debts in the case of the late Foundling Estate, in which the several parishes of St. Pancras, St. George, Bloomsbury, and St. George-the-Martyr are concerned. They have also apportioned the debts of the former Commercial-road Trust, affecting the parishes and hamlets of St. George-in-the-East, Mile-end Old-town, Limehouse, Ratcliff, and Poplar. In those cases the proportion of debt applicable to each, and the locality where rates are to be raised for payment of principal and interest, required to be defined; and, in carrying out this provision of the Act, much time was necessarily consumed in conference with the several vestries and bodies interested, and in the examination of the local Acts, and the documentary evidence bearing upon the transactions.

The Board are now engaged in the necessary investigations for making apportionments in the case of the late Ratcliff Trust, the Goswell-street Trust, the Clapham Lighting Trust, and the St. George's Pavement Commission.

Management of Line of Street situate in more than one Parish.

Several applications have been made to the Board, under the 140th section of the Metropolis Management Act, authorising them, where they think fit, to place a line of street, situate in more than one parish or district, under the exclusive management of one vestry or district board, for all or any of the purposes of the Act. The Board, after investigation, considered only one of the cases presented to them a fitting one for the exercise of their jurisdiction in this respect, viz., that relative to Oxford-street, which is situate in the several parishes of St. Marylebone; St. Anne, Soho; St. George, Hanover-square; and St. James, Westminster; and they have placed the whole street under the management of St. Marylebone, for the purposes of the Act.

Time for Making and Collecting Rates in Parishes.

Under the 192d section of the Metropolis Local Management Act, the Board have, on the special application of the vestry of St. Marylebone, passed an order altering the time fixed by the local Act for making and collecting rates in that parish.

Appeals against Orders of Vestries relative to Sewers, &c.

Several notices of appeal have been given to the Board, under the 211th section of the Act against orders and acts of vestries and district boards, relative to the construction of sewers and drains, the demolition of houses, &c. In several of these cases the Board have declined to entertain the appeal, considering that the subject of it did not fall within their jurisdiction. Four cases have been tried by the Committee of Appeal; in two of these cases the appeals were dismissed, and in the others the appeals were allowed, and the orders quashed.

Rates made by the Metropolitan Commissioners of Sewers.

The amount of outstanding district sewers' rates was, on the 1st January 1856, 57,335 *l.* 9 *s.* 1 *d.*, of which 43,239 *l.* 16 *s.* 8 *d.* has been collected and paid to the treasurer. The total amount due on improvement rates is 5,745 *l.* 9 *s.* 1 *d.*, which rates are in gradual course of collection. The amount collected on account of improvement rates between 1st January 1855 and 1857 was 1,155 *l.* 19 *s.* 3 *d.*

Mortgage, Debts, and Special Liabilities of Sewers' Commission, and Financial Condition of the Metropolis.

The Board having ascertained the financial condition of the several parts of the Metropolis, and other localities without the metropolitan area, charged with mortgages, debts, and liabilities, at the expiration of the Metropolitan Sewers Act, it resulted that the sums due on mortgages, loans, and special liabilities at the commencement of the Act, were 442,902 *l.* 12 *s.* In this amount is included a sum of 24,212 *l.* 17 *s.* 5 *d.*, the claim in respect of the Ordnance Survey of the metropolis, and it also comprises a sum of 126,000 *l.*, specially appropriated to the main drainage. Of this last amount, which stands as a credit to the Board, 50,000 *l.* is in hand, and the difference is payable by certain parishes and districts under the precepts issued by the Board.

The debts charged upon the several sewers districts at the determination of the late Commission have been apportioned among the several parishes of the metropolis, according to their assessment to the county rate, or a like estimate. A portion of the above debts is payable by instalments, or at stated periods, but in other cases the Board have directed that 5 *l.* per cent. of the principal money due should be raised and invested for the purpose of providing a fund for the repayment of those debts in accordance with the 181st section of the Aet, and, on the 13th of March last, the Board issued precepts for raising, for the purposes of the Act, the sum of 98,457 *l.* 8 *s.* 10 *d.* The accounts of the Board were audited by William Andoe, esq., the auditor appointed by Secretary Sir George Grey, on the 30th of May, the result of which appears by the certificate attached to the accompanying abstract.

Between 1st January 1856 and the 30th June 1857, meetings of the Board took place on 125 different days, besides which, during the same period, there were 145 committee meetings, making a total of 270 meetings.

Further details connected with the special business in the several departments of the Board will be found in the annexed Reports, and full information relative to the receipts and expenditure of the Board is contained in the accompanying Abstract and Statement.

In conclusion, the Board have to add that, though in the practical application of two new Acts, so comprehensive in their character, and involving such extensive changes as those by which their principal duties are defined, they cannot fail to have become impressed with the necessity of various amendments, they think it right to defer until the next Session of Parliament the suggestions which they have to offer, deeming it essential that any changes which may hereafter be introduced should be founded on a longer observation and more matured experience of the operation of the existing law.

By order,
E. H. Woolrych,
Clerk of the Board.

Engineer's Department,
No. 1, Greek-street, Soho-square,
10 June 1857.

Report upon the Works executed and Business transacted in the Engineer's Department, between the 1st of January 1856 and the 25th of March 1857, in pursuance of the 200th Section of the Metropolis Local Management Act.

To the Metropolitan Board of Works.

Mr. Chairman and Gentlemen,

Sewers and works transferred to the Metropolitan Board of Works under the Metropolis Local Management Act.

At the first meeting of the Board for the transaction of business, which was held on the 1st January 1856, I received your instructions to make temporary arrangements for proceeding with the execution of the contracts entered into by previous metropolitan commissioners of sewers, and then in progress; and for the maintenance of the main sewers enumerated in Schedule (D.) of the Metropolis Local Management Act, until the Board should have appointed its officers and made its permanent arrangements; and on the 5th of the same month I reported to you that there were 166 miles of main sewers placed by the Act under your charge: viz., 106 on the north side of the river, and 60 on the south side; besides 27 contracts for the construction of new sewers, which had been entered into by previous metropolitan commissioners of sewers, some of which were nearly completed, and others only recently commenced. These new sewers are mainly district sewers, and have been built in about 200 different streets, extending over various parts of the metropolis. The completion and measuring up of these works, and their maintenance for six months after the date of completion, together with the settlement of accounts, involving numerous collateral claims, and the periodical advances and final payments consequent thereon, have devolved upon this Board. The Metropolitan Board has also entered into and executed several special contracts for the performance of works urgently needed in connexion with main sewers, and into general contracts for the cleansing, maintenance, and repair of the main sewers. Detailed statements, showing the nature and cost of the foregoing works, together with the localities in which they have been executed, are given in the following Tables, numbered 1 and 2.

Works completed by the Metropolitan Board of Works up to 25 March 1857.

Under the above-named contracts upwards of 18 miles of new sewers have been constructed, at a cost of 98,946 *l.* 19 *s.* 8 *d.* The cleansing of 166 miles of main sewers has cost 7,318 *l.* 5 *s.* 7 *d.*, and the repairs to the same have amounted to 3,949 *l.* 4 *s.* 1 *d.*; in addition to which, the pumping at the Ravensbourne Outlet and incidental works have cost 677 *l.* 19 *s.* 6 *d.*; making a total expenditure upon sewerage works of 110,892 *l.* 8 *s.* 10 *d.* This amount does not include the cost of attending to the flaps and penstocks of the 64 outlets of main sewers, which, being paid in salaries, has hitherto been included in the cost of superintendence; but which, being actual labour performed in the sewers, is in reality a work of maintenance rather than of supervision.

Interception of the sewage of the metropolis from the River Thames.

The next point to which the attention of the Board has been directed, was the subject of the interception of the metropolitan sewage from the River Thames, for having, on the 25th of January 1856, appointed your engineer, the Board on the 8th February resolved,

"That this Board, impressed with the necessity of at once proceeding with the works necessary for the complete interception of the sewerage of this metropolis, requests the chief engineer to report to this Board, at the earliest possible period, as to the plans necessary for the accomplishment of such object."

In obedience to those instructions my Report upon the main intercepting scheme for the districts on the south side of the Thames was presented to the Board on the 4th of April, and the Report and plans for the districts on the north side of the Thames were presented on the 23d May 1856. From the date of the presentation of the first Report, the Board continued from time to time to hold special meetings for the consideration of that subject, in addition to the ordinary meetings for the transaction of the current business. Thus, between the 4th April and the 16th December 1856, the Board devoted 21 days for the special consideration of this subject alone, in addition to its interviews with the First Commissioner of Works, and the attention given to the subject at ordinary board and committee meetings.

On the 3d June, a deputation waited on the Chief Commissioner, and presented to him the plan for the districts on the south side of the Thames, which had been adopted by the Board on the 26th of May. On the 3d July, the Chief Commissioner returned the plans, objecting to the point of outfall, accompanied by a Report on the flow of the tide by Captain Burstall. On the 5th November the Board again waited on the Chief Commissioner, and laid before him a plan for both sides of the river, with outfalls below the metropolitan boundaries which had been adopted by the Board on the 22d October.

On the 12th November this plan was rejected and returned by the Chief Commissioner, who again objected to the points of outfall. The Chief Commissioner, at the same time, intimated that he was willing to receive a deputation from the Board upon this subject, and a deputation accordingly waited upon him on the 20th November, at which interview the Chief Commissioner read a letter from Captain Burstall, suggesting other points of outfall. On the 16th December, the Board adopted the outfalls thus suggested, and on the 22d December again presented their plan, with the amended outfalls, for the approval of the Chief Commissioner, whose approval it still awaits. Thus reports and designs have been made upon a variety of points of outfall in order to enable the Board to weigh their comparative merits, and in preparing the plans and sections which formed the foundations of those reports, 150 miles of main sewers have been surveyed and designed, and estimates prepared to the amount of upwards of 8,000,000 *l.*; involving numerous borings, cross sections of the River Thames at various points, the computation of their respective areas, and experiments upon the tidal flow. The plans of numerous drainage schemes which have from time to time been suggested to the Board from without have also been considered, and their plans and estimates more or less minutely investigated.

Applications from vestries and district boards for the approval of the Metropolitan Board of Works to the construction of new sewers.

The 69th section of the Metropolis Local Management Act, which provides that no new sewer shall be made by the vestries and district boards of works, without the previous approval of the Metropolitan Board of Works, engaged your early attention. Bye-laws and plans, copies of which are appended, defining the mode of making application for such approval, were considered, and were confirmed by you on the 28th March, and sent to each of the vestries and district boards on the 18th of April 1856. The result of the business transacted during the first year's operation of this clause is shown in detail in the following Table, No. 3. Applications, which have been sanctioned, were received from the vestries and district boards for permission to construct 44 ¾ miles of sewers, at a probable cost of upwards of 100,000 *l.*, which, added to those completed by the Metropolitan Board of Works, make a total of about 63 miles of sewers. The plans for the district sewers have been carefully examined with a view to the preservation of drainage outfalls for the adjoining and upper districts, and a comprehensive system of drainage and interception; and to provide for future requirements and general efficiency.

The plans submitted have from time to time been modified by the Metropolitan Board, with the foregoing objects; and considering that those works have been designed by 42 different surveyors, and adopted by 37 vestries or district boards, before they were submitted to the Metropolitan Board, it is satisfactoryto observe, that the modification of such plans which have been suggested by this Board have been adopted by the several vestries and district boards in a business-like spirit, and without any indication of jealousy or dissatisfaction, so that the delays and difficulty which might have arisen in the working of this section of the Act have been altogether avoided.

Applications from vestries and district boards for the sanction of the Metropolitan Board of Works to their raising loans.

Under the 183d section, applications have been made by the vestries and district boards for the sanction of the Metropolitan Board of Works to their raising by loan, upon the mortgage of their rates, various amounts for the execution of sewerage or paving works within their several districts. The objects, cost, and efficiency of the proposed works, and the general terms upon which it was proposed to raise and repay the several sums, were duly weighed by you, and loans, amounting to 34,700 *l.*, have from time to time received your sanction, as shown in Table, No. 4.

Condition of main sewers under Schedule (D.) examined, and plans and estimates prepared for the works necessary to make them efficient.

The condition of the 166 miles of main sewers, included in Schedule (D.) of the Metropolis Local Management Act, has also engaged your attention; and, in pursuance of an order of the Board on the 4th of July, longitudinal and cross sections, showing the general construction of these sewers, were prepared and lithographed for the use of the Metropolitan and district boards.

Since the completion of the main intercepting scheme, the present condition of all main sewers under the jurisdiction of the Board has been examined, and the works necessary to repair and render them efficient, having reference to the main intercepting sewers, designed and estimated.

This last has also involved the preparation of very elaborate detailed drawings, estimates, and calculations of drainage areas, which are now nearly completed, and will very shortly be laid before the Board; and inasmuch as a large proportion of the works about to be recommended may be executed independently of any scheme of interception, it is probable that in the course of the present summer large and important works will be commenced, from which extensive and permanent benefit will be immediately derived.

Maps and drawings prepared.

Maps of some of the districts, which were not completed by the Metropolitan Commission of Sewers, were completed by this Board, giving, in detail, the sizes and levels of their sewers. A complete copy of the subterranean survey, to the scale of five feet to a mile, has been prepared to supply the place of the only previously existing map, which was nearly worn out. This survey covers about eight hundred sheets of double-elephant paper, closely covered with minute drawings and figures, and is a most valuable document. Various plans, showing main and district sewers, for Sir B. Hall and the Referees on the main drainage, and for other purposes, have been completed

Bills before Parliament examined, and clauses introduced therein.

The plans of all Bills presented to Parliament during the Session for the execution of works within the metropolitan area have been examined, to ascertain how far they interfere with metropolitan sewers, and clauses introduced therein for the protection of the powers vested in the Board.

The charge of river outlets, flaps, and penstocks readjusted.

The Metropolitan Board continued the charge of all the river flaps and penstocks, 167 in number, until their management was readjusted, in conjunction with the several vestries and district boards; and on the 8th of August 1856, 19 sluice-keepers were appointed by this Board to take charge of the main outlets, some of whom were appointed by the district boards to take charge of their outlets also.

Connexions formed with main sewers.

There have been 563 applications from vestries and district boards, to drain into main sewers, and 660 connexions therewith have been formed and superintended by the officers of this Board.

General business transacted.

In the early part of 1856, a very considerable portion of your engineer's time was occupied by interviews with the public and the surveyors to the several district boards, who, owing to their districts and duties being then new to them, required your assistance and advice. These interviews have considerably accelerated the transaction of business, by avoiding the necessity for letters and explanatory reports, although the amount of labour thus saved is not apparent.

Your engineer has, up to the 25th of March last, attended 149 Board and committee meetings, has presented for your consideration 412 reports, and has issued 1,367 official letters.

I have, &c.
J. W. Bazalgette, Engineer.

TABLE No. 1. - - - - - - - - - -

SUMMARY STATEMENT and REPORT of CONTRACTS entered into by the late Metropolitan Commissioners and completed by the Metropolitan Board of Works, or

CONTRACTS FOR THE PERFORMANCE OF SPECIAL WORKS. - - - - - - - - - -

Date of Contract.	Former Names of the Drainage Areas which define the Districts benefited by the Works included within such Areas.	Districts included in the foregoing Drainage Areas.	LOCALITY.	Name of Contractor.
1854: 18 August - -	Counter's Creek - Ranelagh - - Fulham, &c. - -	St. Marylebone. St. George, Hanover-square. Paddington. Chelsea. St. Mary Abbotts, Kensington. St. Margaret and St. John, Westminster. St. Peter and St. Paul, Hammersmith. Fulham. Willesden. St. John, Hampstead. Acton, Ealing. Chiswick.	Counter's Creek Sewer, from the River Thames, near Cremorne Gardens, in and along a meadow south of the lane leading to Cremorne Gardens and Ashburnham House and Cottage; grounds attached to Ashburnham House; meadow land, occupied by Mr. Simpson, and garden, to the King's-road; Gunter's-grove to Fulham-road; orchard and market gardens, north of the Fulham-road and east of Honey-lane, to Richmond-road; market gardens and fields to Warwick-road; Warwick-road, Holland-road, and certain fields to the Uxbridge-road, in the respective parishes of St. Luke, Chelsea, and St. Mary Abbotts, Kensington.	R. T Carlisle and Newton & Smith.
3 October and 29 July 1856.	Greenwich and Ravensbourne.	St. Paul, Deptford. Greenwich. Camberwell. Charlton. Eltham. Lee. Kidbrooke. Lewisham.	Ravensbourne Outlet.	David Croft.
1855: 7 May - -	Holborn and Finsbury	St. Marylebone. St. Pancras. St. Mary, Islington. St. Leonard, Shoreditch. St. James and St. John, Clerkenwell. St. Luke, Middlesex. St. John, Hampstead. St. Giles and St. George, Bloomsbury. St. Andrew and St. George-the-Martyr. Saffron-hill, Hatton Garden. Liberty of the Rolls. Liberty of Norton Folgate. St. Mary, Stoke Newington. St. Sepulchre, Middlesex. Liberty of Glass-house Yard. Gray's-Inn. Southampton-buildings, &c. and the Charter House (extra-parochial). Hornsey.	New Victoria-street. Ray-street. Little Saffron-hill. Back-hill. In the parish of Clerkenwell.	John Phillips.
22 June - -	Fulham and Hammersmith.	St. Peter and St. Paul, Hammersmith. Fulham. Willesden. Acton. Ealing. Chiswick.	Webbs-lane. Askew-road. New-road. Victoria-road. Starch-green. In the parish of Hammersmith.	Richard Batterbury.
13 August - -	Eastern Division of the Westminster Sewers.	St. Marylebone. St. Pancras. St. James, Westminster. St. Martin's-in-the-Fields. St. Giles and St. George, Bloomsbury. St. Anne, Soho. St. Paul, Covent Garden. Precinct of the Savoy. St. Mary-le-Strand. St. Clement Danes.	King-street. Princes-row. Crown-street. Newport-market. Rose-street. Portland-street. Sutton-street. Portland-mews. Sutton-place. Coventry-street. Falconberg-court. Arundel-street. Carlisle-street. Panton-square. Gerrard-street. Bedford-street. Nassau-street. Bedford-court. Grafton-street. Covent Garden-market. Litchfield-street. Bear-yard. In the respective parishes of St. James, Westminster, St. Anne, Soho; and St. Clement Danes.	Edward Thirst.

- - - - - - - - - - Table No. 1.

of Sewers, and continued and completed by the Metropolitan Board of Works; also of Contracts entered into in course of completion, up to the 25th March 1857.

. . . . CONTRACTS FOR THE PERFORMANCE OF SPECIAL WORKS.

Quantity of Work agreed to be executed.	CONTRACT PRICE.			Total Quantity of Work Executed.	Amount of Extras and Additional Works beyond Sum provided in Contract.	Amount of Deductions and Omissions from Contract.	Actual Cost of Work.	Observations.
	Contract Sum.	Amount provided for Extras.	TOTAL.					
	£.	£.	£.		£. s. d.	£. s. d.	£. s. d.	
1,285 ft. sewer | 9′ 6″ by 9′ 0″ 11,345 ft. sewer | 8′ 6″ by 8′ 0″ with outlet into the river Thames, 230 ft. long, and flap chamber. 6 ventilators. 14 side entrances. 12,600 cubic yards excavation. 12,600 cubic yards concrete.	40,870	1,500	42,370	3,086 yards cube excavation. 3,086 yards concrete. 1,285 ft. sewer | 9 ft. 6 by 9 ft. 11,348 ft. sewer | 8 ft. 6 by 8 ft. No. 15 air shafts. 10 side entrances.	7,131 7 3	5,779 12 3	43,722 15 –	Completed.
Supplying fuel and working and maintaining steam engines and the pumps connected therewith.	- -	- -	590 200	per annum from 1st of January till the 19th of July 1856. per annum from July 1856 to 25 March 1857.	- - -	- - -	465 3 3	In progress.
1,330 ft. sewer | 10 ft. diameter 150 ft. sewer | 3′ 9″ by 2′ 6″ 770 ft. 12-inch pipe sewer. 400 ft. 9-inch pipe sewer. 5 ventilators. 1 side entrance. 7 bell mouths. 12 gulleys. 60 6-inch drain mouths. 4 junctions.	3,639	750	4,389	1,300 ft. sewer | 10 ft. diameter 150 ft. sewer | 3 ft. 9 by 2 ft. 6 808 ft. of 12″ and 400 ft. 9″ pipe sewer. 5 ventilators. 12 gulleys. 1 side entrance. 10 bell mouths. 33 6-inch and 33 9″ drain mouths. 4 junctions.	606 4	- - -	4,995 4 11	Completed.
2,975 ft. sewer | 5′ 0″ diameter 870 ft. sewer | 4′ 0″ by 2′ 9″	2,500	400	2,900	3,072 ft. sewer | 5 ft. diameter 893 ft. sewer | 4 ft. by 2 ft. 9″ 5 side entrances. 35 gulleys. 11 ventilating shafts.	867 13 5	- - -	3,767 13 5	Completed.
3,470 ft. sewer | 3′ 9″ by 2′ 6″ 420 ft. sewer | 3′ 0″ by 2″ 0″ 2,950 ft. 12-inch pipe sewer. 14 ventilators. 2 side entrances. 4 bell mouths. 30 gulleys. 18 flushing boxes. 180 6-inch drain mouths. 150 12-inch junctions.	3,239	1,100	4,339	3,440 ft. sewer | 3 ft. 9 by 2 ft. 6 538 ft. sewer | 3 ft. by 2 ft. 2,882 ft. 12-inch pipe sewer. 14 ventilators. 48 gulleys. 2 side entrances. 4 bell mouths. 18 flushing boxes. 180 6-inch drain mouths. 150 12-inch junctions.	529 12 7	93 16 1	4,774 16 6	Completed.
					Carried forward - - - £.		57,724 13 1	

TABLE No. 1.—SUMMARY STATEMENT and Report of Contracts entered into by the late Metropolitan Commissioners

CONTRACTS for the Performance of Special Works. - - - - - - - - - - -

Date of Contract.	Former Names of the Drainage Areas which define the Districts benefited by the Works included within such Areas.	Districts included in the foregoing Drainage Areas.	LOCALITY.	Name of Contractor.
1855: 13 August - -	Finsbury - - -	St. Mary, Islington. St. Leonard, Shoreditch. St. James and St. John, Clerkenwell. St. Luke, Middlesex. Liberty of Norton Folgate. St. Mary, Stoke Newington. St. Sepulchre, Middlesex. Liberty of Glasshouse-yard. The Charter House (extra-parochial.) Hornsey.	Clerkenwell Green. Aylesbury-street. Featherstone-street. Bunhill-row. Curtain-row. Dalby-terrace. Britannia-row. White Conduit-street. Queen-street. Hoxton-square. Upper George's-place. Holloway-road. In the respective parishes of Clerkenwell, St. Leonard, Shoreditch, and St. Mary, Islington.	W. H. Rowe.
13 August - -	Ranelagh - -	St. Marylebone. St. George, Hanover-square. Paddington. Chelsea. St. Mary Abbotts, Kensington. St. John, Hampstead. St. Margaret and St. John, Westminster. Willesden.	Queen's-road, East. Franklin's-row. White Lion-street. Turk's-row. In the parish of St. Luke, Chelsea.	W. H. Rowe.
29 September -	Greenwich and Ravensbourne.	St. Paul, Deptford. Greenwich. Camberwell. Charlton. Eltham. Lee. Kidbrook. Lewisham.	Near to the North Kent Railway, leading from Lewisham-road to the Blackheath Railway Station. Avenue-road. Lewisham-grove. Holmesdale. Loampit-vale. Dacre-park. Dacre-road. Dacre-place and Lee-road, Blackheath. In the respective parishes of Lewisham and Greenwich.	Lee and Lavers.
4 October - -	Ranelagh - -	St. Marylebone. St. George, Hanover-square. Paddington. Chelsea. St. Mary Abbotts, Kensington. St. John, Hampstead. St. Margaret and St. John, Westminster. Willesden.	Craven-lane. Craven-hill. Uxbridge-road. Canterbury-Mews. Carlton-mews. Edgware-road. Maida-hill. St. John's-wood-road. Elm Tree-road. Grove-end-road. Greville-place. Grosvenor-road, Kilburn. In the respective parishes of St. Mary, Paddington; and St. Marylebone.	Lee and Lavers.
5 October - -	Ranelagh - -	St. Marylebone. St. George, Hanover-square. Paddington. Chelsea. St. Mary Abbotts, Kensington. St. John, Hampstead. St. Margaret and St. John, Westminster. Willesden.	Marlborough-road. Cumberland-place. Old Brompton-lane. In the respective parishes of St. Luke, Chelsea; and St. Mary Abbotts, Kensington.	G. and C. W. Todd.
16 October - -	Counter's Creek -	Paddington. Chelsea. St. Mary Abbotts, Kensington. St. Margaret and St. John, Westminster. St. Peter and St. Paul, Hammersmith. Fulham. Willesden.	King's-road, Chelsea.	Culverhouse and Nicholson.

of Sewers, and continued and completed by the Metropolitan Board of Works, &c.—*continued.*

- - - - - - - - - - CONTRACTS for the Performance of Special Works.

Quantity of Work agreed to be Executed.	CONTRACT PRICE.			Total Quantity of Work Executed.	Amount of Extras and Additional Works beyond Sum provided in Contract.	Amount of Deductions and Omissions from Contract.	Actual Cost of Work.	Observations.
	Contract Sum.	Amount provided for Extras.	TOTAL.					
	£.	£.	£.		£. s. d.	£. s. d.	£. s. d.	
					Brought forward	- - -	57,724 13 1	
3,205 ft. sewer | 3′ 9″ by 2′ 6″ 2,630 ft. sewer | 3′ 0″ by 2′ 0″ 370 ft. 18-inch diameter. 1,490 ft. 12-inch pipe sewer. 14 ventilators. 6 side entrances. 9 bell mouths. 37 gulleys. 4 flushing boxes. 50 9-inch drain mouths. 160 6-inch drain mouths. 76 12-inch junctions.	4,031	600	4,631	3,205 ft. sewer | 3′ 9″ by 2′ 6″ 2,630 ft. sewer | 3′ 0″ by 2′ 0″ 370 ft. 18-inch diameter. 1,568 ft. 12-inch pipe sewer. 13 ventilators. 47 gulleys. 6 side entrances. 8 bell mouths. 5 flushing boxes. 50 9-inch drain mouths. 172 6-inch drain mouths. 82 12-inch junctions.	461 18 7	80 6 3	5,012 2 4	Completed.
1,750 ft. sewer | 3′ 9″ by 2′ 6″ 3 ventilators. 4 side entrances. 3 bell mouths. 10 gulleys. 50 6-inch drain mouths.	1,069	200	1,269	1,797 ft. sewer | 3′ 9″ by 2′ 6″ 3 ventilators. 20 gulleys. 4 side entrances. 3 bell mouths. 87 6-inch drain mouths.	157 13 2	- - -	1,426 13 2	Completed.
4,620 ft. sewer | 3′ 0″ by 2′ 0″ 747 ft. sewer | 2′ 0″ diameter 2,500 ft. sewer | 2′ 0″ by 1′ 6″ 840 ft. sewer | 1′ 6″ diameter 930 ft. 12-inch pipe sewer. 19 ventilators. 3 bell mouths. 1 flushing box. 26 12-inch drain mouths. 61 9-inch drain mouths. 277 6-inch drain mouths. 30 6-inch junctions.	2,119	250	2,369	4,547 ft. sewer | 3′ 0″ by 2′ 0″ 480 ft. sewer | 2′ 0″ diameter 2,649 ft. sewer | 2′ 0″ by 1′ 6″ 246 ft. of 6-inch, and 246 ft. of 9-inch pipe. 1,661 ft. of 12-inch pipe sewer. 16 ventilators. 10 manholes. 3 bell mouths. 1 12-inch drain mouth. 25 9-inch drain mouths. 98 6-inch drain mouths. 56 12-inch junctions.	574 19 11	263 15 –	2,680 4 11	Completed.
5,700 ft. sewer | 3′ 9″ by 2′ 6″ 8 ventilators. 4 side entrances. 3 bell mouths. 26 gullies. 50 9-inch drain mouths. 92 6-inch drain mouths.	3,447	500	3,947	5,681 ft. sewer | 3′ 9″ by 2′ 6″ 6 bell mouths. 6 side entrances. 6 ventilating shafts. 26 gulleys. 30 9-inch drain mouths. 68 6-inch drain mouths.	40 2 2	33 8 5	3,953 13 9	Completed.
1,324 ft. sewer | 3′ 9″ by 2′ 6″ 1 ventilator. 5 side entrances. 16 gulleys. 89 6-inch drain mouths.	783	100	883	1,332 ft. sewer | 3′ 9″ by 2′ 6″ 5 side entrances. 12 gulleys. 1 ventilating shaft. 92 6-inch drain mouths.	- - -	65 3 1	817 16 11	Completed.
590 ft. sewer | 3′ 9″ by 2′ 6″ 2 side entrances. 1 bell mouth. 6 gulleys. 56 6-inch drain mouths.	408	200	608	601 ft. sewer | 3′ 9″ by 2′ 6″ 2 side entrances. 8 gulleys. 1 bell mouth. 4 ventilating shafts. 49 6-inch drain mouths.	147 16 2	1 15 0	754 1 2	Completed.
					Carried forward	- - - £.	72,369 5 4	

TABLE No. 1.—SUMMARY STATEMENT and Report of Contracts entered into by the late Metropolitan Commissioners

CONTRACTS for the Performance of Special Works.

Date of Contract.	Former Names of the Drainage Areas which define the Districts benefited by the Works included within such Areas.	Districts included in the foregoing Drainage Areas.	LOCALITY.	Name of Contractor.
1855: 24 October	Holborn	St. Marylebone. St. Pancras. St. John, Hampstead. St. Giles and St. George. St. Andrew and St. George the Martyr. Saffron-hill, Hatton-garden. Liberty of the Rolls. Gray's Inn. Southampton-buildings (extra-parochial).	Leigh-street. Bidborough-street. Claremont-place. Hastings-street. Draper's-place. South-place, New-road. St. Chad's-place. Fifteen-foot-lane. Bell-court. Field-street. Paradise-street. Britannia-street. Gough-street. Gray's-Inn-road. Vittoria-place. Brunswick-street. Little Ormond-yard. Ormond-place. Great Ormond-yard. Queen-square. Tennis-court. Middle-row. In the respective parishes of St. Andrew's, Holborn, and St. Pancras.	W. H. Rowe.
6 November	Greenwich and Ravensbourne.	St. Paul, Deptford. Greenwich. Camberwell. Charlton. Eltham. Lee. Kidbrooke. Lewisham.	Brockley-lane and Ladywell, Lewisham, and Perry-hill, Sydenham. In the parish of Lewisham.	Richard Goodison.
26 November	Western Division and Eastern Division of Westminster Sewers.	St. Marylebone. St. Pancras. St. George, Hanover-square. St. James, Westminster. St. Martin-in-the-Fields. St. Giles and St. George. St. John, Hampstead. St. Margaret and St. John, Westminster. St. Anne, Soho. St. Paul, Covent-garden. Precinct of the Savoy. St. Mary-le-Strand. St. Clement Danes.	Whitehall-place and Whitehall. In the respective parishes of St. Martin-in-the-Fields and St. Margaret, Westminster.	William Dethick.
11 December	Western and Eastern Divisions of Westminster Sewers.	St. Marylebone. St. Pancras. St. George, Hanover-square. St. James, Westminster. St. Martin-in-the-Fields. St. Giles and St. George. St. John, Hampstead. St. Margaret and St. John, Westminster. St. Anne, Soho. St. Paul, Covent-garden. Precinct of the Savoy. St. Mary-le-Strand. St. Clement Danes.	Whitehall, Horse Guard's-yard, and Parade-ground, St. James's-park. In the parish of St. Martin-in-the-Fields.	Joseph Yeoman.
17 December	Western Division of Westminster Sewers.	St. Marylebone. St. George, Hanover-square. St. James, Westminster. St. Martin-in-the-Fields. St. John, Hampstead. St. Margaret and St. John, Westminster.	North-row. Adam's-mews. Carrington-street. St. James's-square. Dartmouth-street. Little Chapel-street. Perkin's-rents. Duck-lane. Medway-street. Old Rochester-row. New-street, Vauxhall. Bridge-road. Devonshire-mews, East. Glo'ster-mews, West. Malcombe-mews. Ordnance-mews, &c. In the respective parishes of St. Martin-in-the-Fields; St. George, Hanover-square, St. Marylebone; and St. James, Westminster.	William Dethick.

of Sewers, and continued and completed by the Metropolitan Board of Works, &c.—(*continued.*)

- - - - - - - - - Contracts for the Performance of Special Works.

Quantity of Work agreed to be Executed.	CONTRACT PRICE.			Total Quantity of Work executed.	Amount of Extras and Additional Works beyond Sum provided in Contract.	Amount of Deductions and Omissions from Contract.	Actual Cost of Work.	Observations.
	Contract Sum.	Amount provided for Extras.	Total.					
	£.	£.	£.		£. s. d.	£. s. d.	£. s. d.	
					Brought forward	- - -	72,369 5 4	
950 ft. sewer | 3′ 0″ by 2′ 0″ 4,830 ft. 12-inch pipe sewer. 280 ft. 9-inch pipe sewer. 4 ventilators. 2 side entrances. 30 gulleys. 23 flushing boxes. 148 6-inch drain mouths 7 12-inch junctions. 428 6-inch junctions.	1,564	550	2,114	964 ft. sewer. | 3 ft. by 2 ft. 500 6 ft. 12″ pipe sewer. 258 ft. 9″ pipe sewer. No. 5 ventilators, 39 gulleys. 2 side entrances. 24 flushing boxes. 140 6″ drain mouths. 454 6″ junctions. 10 9″ junctions. 19 12″ junctions. 1 bell mouth.	171 16 5	- - -	2,285 16 5	Completed.
1,550 ft. sewer. | 3′ 9″ by 2′ 6″ 68 ft. sewer. | 3′ 0″ by 2′ 0″ 1,142 ft. 12-inch pipe sewer. 3 ventilators. 2 side entrances. 2 bell mouths. 3 flushing boxes. 3 12-inch drain mouths. 10 9-inch drain mouths. 30 6-inch drain mouths. 10 9-inch junctions. 60 6-inch junctions.	1,322	320	1,642	1,676 ft. sewer. | 3 ft. 9 by 2 ft. 6. 380 ft. sewer. | 3 ft. diameter. 600 ft. sewer. | 3 ft. by 2 ft. 2,047 ft. of 12″ pipe sewer. 34 ft. of 9″ and 68 ft. of 6″ pipe. 7 ventilators. 2 side entrances. 1 bell mouth, 1 man-hole. 7 6″ drain mouths. 10 9″ drain mouths. 24 12″ drain mouths.	169 10 6	8 10 8	1,802 19 10	Completed.
850 ft. sewer. | 3′ 9″ by 2′ 6″ 250 ft. 12-inch pipe sewer. 3 ventilators. 1 side entrance. 2 bell mouths. 16 gulleys.	838	600	1,438	852 ft. sewer. | 3 ft. 9 by 2 ft. 6. 362 ft. 12″ pipe. 3 ventilators, 14 gulleys. 2 side entrances, 2 bell mouths.	399 12 11	10 15 6	1,826 17 5	Completed.
880 ft. sewer. | 3′ 9″ by 2′ 6″ 380 ft. sewer. | 3′ 0″ by 2′ 0″ 300 ft. 12-inch pipe sewer. 880 ft. 9-inch pipe sewer. 280 ft. iron pipe | 2′ 6″ diameter. 3 ventilators. 2 bell mouths. 21 gulleys.	1,790	500	2,290	843 ft. sewer. | 3 ft. 9 by 2 ft. 6. 301 ft. sewer. | 3 ft. by 2 ft. 246 ft. of 12-inch pipe sewer. 661 ft. of 9-inch pipe sewer. 104 ft. iron pipe 2 fit. 6″ diameter. No. 3 ventilators. 2 bell mouths. 19 gulleys.	1,407 18 1	266 18 7	3,430 19 6	Completed.
1,060 ft. sewer. | 3′ 9″ by 2′ 6″ 3,370 ft. sewer. | 3′ 0″ by 2′ 0″ 10,870 ft. 12-inch pipe sewer. 320 ft. 9-inch pipe sewer. 14 ventilators. 4 side entrances. 12 bell mouths. 170 gulleys, 61 flushing boxes. 211 6-inch drain mouths. 53 12-inch junctions. 8 9-inch junctions. 769 6-inch junctions.	4,666	1,700	6,366	1,808 ft. sewer. | 3 ft. 9 by 2 ft. 6. 2,673 ft. sewer. | 3 ft. by 2 ft. 9,809 ft. 12″ pipe sewer. 320 ft. 9″ pipe sewer. No. 14 ventilators, 170 gulleys. 3 side entrances. 12 bell mouths. 61 flushing boxes. 211 6″ drain mouths. 53 12″ junctions. 8 9″ junctions. 769 6″ junctions.	684 4 2	372 14 8	6,677 9 6	Completed.
					Carried forward	- - - £.	88,393 8 -	

TABLE No. 1.—SUMMARY STATEMENT and Report of Contracts entered into by the late Metropolitan Commissioners

CONTRACTS for the Performance of Special Works. - - - - - - - - - - -

Date of Contract.	Former Names of the Drainage Areas which define the Districts benefited by the Works included within such Areas.	Districts included in the foregoing Drainage Areas.	LOCALITY.	Name of Contractor.
1855:				
31 December - -	Western and Eastern Divisions of Westminster Sewers, and Regent-street.	St. Marylebone. St. Pancras. St. George, Hanover-square. St. James, Westminster. St. Martin-in-the-Fields. St. John, Hampstead. St. Margaret and St. John, Westminster. St. Giles and St. George, Bloomsbury. St. Anne, Soho. St. Paul, Covent-garden. Precinct of the Savoy. St. Mary-le-Strand. St. Clement Danes.	Victoria-street Sewer, and Middle Scotland Yard, in the parish of St. Martin-in-the-Fields.	Edward Thirst.
31 December - -	Regent-street - -	St. Marylebone. St. Pancras. St. George, Hanover-square. St. James, Westminster. St. Martin-in-the-Fields.	Park Village East. Regent's Park. In the parish of St. Pancras.	Edward Thirst.
1856:				
6 September - -	- - - - -	St. Mary, Lambeth.	Effra Main Sewer. Canterbury-road. North Brixton.	Edward Thirst.
10 October - -	Spitalfields, &c. -	St. Matthew, Bethnal-green. St. George-in-the-East. Mile-end Old-town. St. Mary, Whitechapel. Christ Church, Spitalfields. St. Botolph Without, Aldgate. Mile-end New-town. Old Artillery-ground. St. John at Hackney. St. Anne, Limehouse. St. John of Wapping. St. Paul, Shadwell. Hamlet of Ratcliff. All Saints, Poplar. St. Leonard's, Bromley.	North-street, Rhodeswell-road, and other places near Bow Common.	Joseph Yeoman.
30 October - -	- - - - -	St. Peter and St. Paul, Hammersmith.	Starch-green, Uxbridge-road, and Stamford Brook Sewer.	George Axton.
3 December - -	Counter's Creek District.	Paddington. Chelsea. St. Mary Abbotts, Kensington. St. Margaret and St. John, Westminster. St. Peter and St. Paul, Hammersmith. Fulham. Willesden.	Pembroke-road, Foxley-road, Earl's-court-road, or Earl-street, and Wright's Lane, Kensington.	John Murray.
8 December - -	Poplar and Blackwall	St. Anne, Limehouse. All Saints, Poplar.	Isle of Dogs, extending from West Ferry road, eastward, towards the East Ferry-road.	Joseph Yeoman.

10 June 1857.

of Sewers, and continued and completed by the Metropolitan Board of Works, &c.—*continued.*

- - - - - - - - - - CONTRACTS for the Performance of Special Works.

Quantity of Work agreed to be Executed.	CONTRACT PRICE.			Total Quantity of Work Executed.	Amount of Extras and Additional Works beyond Sum provided in Contract.			Amount of Deductions and Omissions from Contract.			Actual Cost of Work.			Observations.
	Contract Sum.	Amount provided for Extras.	TOTAL.											
	£.	£.	£.		£.	s.	d.	£.	s.	d.	£.	s.	d.	
					Brought forward			- - -			88,393	8	–	
Reconstruction of portion of Sewer, and repairs to Mr. Vertue's premises, No. 4 Middle Scotland Yard.	2½ per cent. under Schedule prices of Jobbing Contract.		say 1,100	- - - - - -	-	-	-	-	-	-	1,703	5	6	Completed
1,700 ft. sewer | 3 ft. by 2 ft. 3 ventilators. 1 side entrance. 8 gulleys. 60 6-inch drain mouths.	580	200	780	1,780 ft. sewer | 3 ft. by 2 ft. 3 ventilators. 1 side entrance. 11 gulleys. 60 6-inch drain mouths.	162	4	10	-	-	-	951	4	10	Complete
300 ft. sewer | 10 ft. by 8 ft.	459	150	609	301 ft. sewer | 10 ft. by 8 ft.	8	8	–	-	-	-	617	8	–	Completed
3,150 ft. sewer | 4 ft. 6 by 3 ft. 7 ventilating shafts. 2 side entrances. 5 bell mouths. 18 9-inch drain mouths (without flaps). 150 6-inch junctions.	1,430	350	1,780	3,100 ft. sewer | 4 ft. 6 by 3 ft. 7 ventilators. 2 side entrances. 7 bell mouths 40 9-inch drain mouths (without flaps). 133 6-inch drain mouths. 150 feet of 12-inch pipe.	-	-	-	-	-	-	2,680	12	6	Inprogres Amount du up to th 25th Marc 1857.
990 ft. sewer | 5 ft. diameter	400	- -	400	990 ft. sewer | 5 ft. diameter	-	-	-	-	-	-	400	–	–	Being a co tribution this Boa towards t Works: total cost which is timated £. 900.
2,880 ft. sewer | 5 ft. 6 by 3 ft. 6 19 ft. sewer in steps. 370 ft. sewer | 4 ft. by 2 ft. 9 3 bell mouths with ventilating shafts. 12 ventilating shafts. 7 side entrances. 12 gulleys.	2,400	1,200	3,600	1,222 ft. sewer | 5 ft. 6 by 3 ft. 6 1 bell mouth. 1 side entrance.	-	-	-	-	-	-	1,350	–	–	Inprogre Amount d up to th 25th Mar 1857.
2,000 ft. sewer | 3 ft. 9 by 2 ft. 6 8 ventilating shafts. 2 side entrances. 4 bell mouths. 40 6-inch drain mouths (without flaps). 20 12-inch junctions. 50 9-inch junctions.	796	200	996	1,417 ft. sewer | 3 ft. 9 by 2 ft. 6 5 ventilating shafts. 14 9-inch junctions. 1 12-inch junctions.	-	-	-	-	-	-	944	1	–	In progre Amcunt d up to tl 25th Mar 1857.
										£.	97,099	19	10	

J. W. Bazalgette, Engineer.

late Metropolitan
urse of completion,

SEWERS.

Stoneware.		
12"	9"	6"
Ft.	*Ft.*	*Ft.*
- -	130	6
- -	-	-
9,932	651	-
- -	-	-
3,367	330	-
5,410	458	-
2,701	200	-
150	-	-

Commissioners of S
up to the 25th of M

Side entrances.	Ventilators.	Gulleys.
No.	No.	No.
9	18	9
17	18	64
3	17	186
1	3	11
4	17	67
3	8	47
6	15	54
3	7	[illegible]

GENERAL ABSTRACT of

		Cir. 10′ 0″ diam.	10′ 0″ × 8′ 0″	9′ 6″ × 9′ 0″
		Ft.	Ft.	Ft.
HACKNEY BROOK LEVEL	St. John at Hackney St. Mary, Stratford-le-Bow	–	–	–
LOWER WAPPING LEVEL	St. George-in-the-East St. John of Wapping St. Paul, Shadwell	–	–	–
LIMEHOUSE LEVEL	St. Anne, Limehouse	–	–	–
UPPER LIMEHOUSE LEVEL		–	–	–
TOWER HILL LEVEL	St. Mary, Whitechapel St. Botolph Without, Aldgate Holy Trinity, Minories Tower, District of	–	–	–
HERMITAGE STREET LEVEL	St. George-in-the-East St. John of Wapping	–	–	–
POPLAR AND BLACKWALL DISTRICT	St. Anne, Limehouse All Saints, Poplar	–	–	–
SURREY AND KENT DISTRICT	Lambeth St. Mary, Newington Camberwell St. George the Martyr, Southwark Bermondsey Rotherhithe St. Paul, Deptford St. Nicholas, Deptford Clapham Tooting, Graveney Streatham Battersea Wandsworth Christchurch, Southwark St. Saviour's, Southwark St. Olave, Southwark St. Thomas, Southwark St. John, Horsleydown Borough Market } Extra-parochial Deptford Dockyard } Extra-parochial Lambeth Palace Croydon	–	301	–
GREENWICH	St. Paul, Deptford Greenwich Kidbrooke Lewisham	–	–	–
WANDLE	Tooting Graveney Streatham Wandsworth Wimbledon Mitcham Merton Wallington Morden	–	–	–
FULHAM AND HAMMERSMITH	St. Peter and St. Paul, Hammersmith Fulham Willesden Acton Ealing Chiswick	–	–	257
RAVENSBOURNE DISTRICT	Camberwell Charlton Eltham Lee Kidbrooke Lewisham	–	–	–
PUTNEY		–	–	–
MAIN DRAINAGE		–	–	–
	TOTAL	1,300	301	1,285

Total length in Miles

10 June 1857.

HE METROPOLITAN BOARD OF WORKS.

TABLE No. 2. - - - - - - - - - - -

orks done within the several Metropolitan Districts under Special and General Contracts entered into by the late

CONSTRUCTION- - - - - - - - - - - - - - -

BRICK SEWERS.													PIPE SEWERS.					
													Iron.			Stoneware.		
8' 6" × 8' 0"	6' 0" × 4' 0"	5' 6" × 3' 6"	5' 3" × 3' 6"	Cir. 5' 0" diam.	4' 6" × 3' 0"	4' 0" × 2' 9"	3' 9" × 2' 6"	Cir. 3' 0" diam.	3' 0" × 2' 0"	Cir. 2' 0" diam.	2' 0" × 1' 6"	Cir. 1' 6" diam.	Cir. 30 ins. diam.	Cir. 24 ins. diam.	Cir. 15 ins. diam.	12"	9"	6"
Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1,417	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	135	-	215	-	430	246	-
-	-	-	-	-	-	-	-	-	1,400	-	-	-	-	-	-	400	56	26
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,269	-	-	-	4,062	-	893	-	-	-	-	-	-	-	-	162	-	-	-
-	-	-	-	-	-	-	1,676	380	3,747	480	2,649	-	-	-	-	3,308	224	288
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11,348	42	1,222	384	4,062	3,130	893	22,802	380	14,033	480	2,649	545	104	215	162	25,696	2,295	320

- - - - 12 miles 1,496 feet.

5 miles 2,394 feet.

- - - - -

Metropolitan Commissione

- - - - - - -

Side entrances.	Ventilators.	Gulleys.	6″
No.	No.	No.	No.
1	- -	- -	-
- -	- -	- -	-
- -	- -	- -	-
- -	- -	- -	-
- -	- -	- -	-
- -	- -	- -	-
1	5	- -	-
5	1	5	-
1	4	- -	-
- -	- -	- -	-
7	14	35	-
2	19	- -	-
- -	- -	- -	-
- -	- -	- -	-
63	136	480	1,2

234.—Sess. 2.

TABLE No. 3.

RETURNS of SEWERS as sanctioned by the Metropolitan Board of Works on Applications made by the Vestries and District Boards of Works, between the 1st January 1856 and the 25th March 1857, the Plans of which have been Examined and Approved or Modified by the Metropolitan Board, with a view to Future Requirements, and a Comprehensive System of Drainage.

	1-BRICK SEWERS.							HALF-BRICK SEWERS.										PIPE SEWERS.			
	Cir. 4′ 0″ Dia.	4′ 6″ × 3′ 0″	4′ 0″ × 2′ 9″	4′ 0″ × 2′ 6″	3′ 9″ × 2′ 6″	3′ 4″ × 2′ 3″	3′ 0″ × 2′ 0″	3′ 9″ × 2′ 6″	Cir. 3′ 0″ Dia.	3′ 6″ × 2′ 6″	3′ 6″ × 2′ 0″	3′ 0″ × 2′ 0″	2′ 6″ × 2′ 0″	Cir. 2′ 0″ Dia.	Cir. 1′ 6″ Dia.	Cir. 1′ 3″ Dia.	Cir. 1′ 0″ Dia.	15″	12″	9″	6″
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
City of London	-	-	-	580	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85	—	—
Saint Marylebone	-	-	-	-	892	-	-	-	-	-	-	-	-	-	-	-	-	-	775	100	—
Saint Pancras	-	-	-	-	2,533	-	-	-	-	-	-	1,092	-	-	-	-	-	-	1,105	—	—
Lambeth	-	3,870	-	-	3,560	-	-	-	-	-	-	6,734	-	-	-	-	-	-	11,050	490	—
Saint George, Hanover-square	-	-	-	-	-	-	-	-	-	-	-	720	-	-	36	-	-	-	785	130	—
Saint Mary, Islington	-	-	-	-	3,630	-	-	1,660	-	1,750	-	3,930	-	-	-	-	-	-	5,729	240	—
Saint Leonard, Shoredich	-	-	-	-	1,722	-	-	-	-	-	-	250	-	-	240	-	-	-	1,850	—	—
Paddington	-	-	-	-	8,560	-	500	-	-	-	-	2,200	-	450	1,198	-	-	200	1,084	—	—
Saint Matthew, Bethnal-green	-	-	-	-	1,711	-	-	-	-	-	-	1,073	-	-	4,365	-	-	-	15,653	—	—
Saint Mary, Newington, Surrey	-	-	-	-	-	-	-	-	-	-	-	110	-	-	-	-	-	-	330	1,100	—
Camberwell	490	-	-	-	355	-	-	-	-	-	-	-	620	2,218	2,260	-	-	-	2,495	-	—
Saint James and Saint John, Clerkenwell	-	-	-	-	-	-	-	-	-	-	-	650	-	-	-	-	-	-	80	1,130	—
Chelsea	-	-	-	-	-	-	-	-	-	-	-	164	-	-	-	-	-	-	2,592	—	—
Saint Mary Abbotts, Kensington	-	-	1,500	-	38	-	-	-	-	-	-	5,745	-	670	-	-	-	-	56	—	—
Bermondsey	-	-	-	-	-	-	-	-	-	-	-	-	-	240	756	-	-	835	4,191	—	—
Saint George-in-the-East	-	-	-	-	-	-	-	-	-	-	-	-	-	1,030	750	-	-	—	—	—	—
Hamlet of Mile End Old Town	-	-	-	-	900	-	-	-	-	-	720	1,435	-	1,250	1,210	-	-	2,230	4,098	—	—
Hampstead	-	-	-	-	-	-	518	548	-	-	-	580	-	-	-	-	-	-	1,425	—	—
Whitechapel	-	-	-	-	176	-	-	-	-	-	-	-	-	-	-	-	-	-	605	90	—
Westminster	-	-	-	-	-	-	-	-	-	-	-	316	-	-	-	-	-	-	350	—	—
Greenwich	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	360	—	—
Wandsworth	-	-	-	-	585	-	-	2,280	494	-	-	3,073	-	-	450	-	-	-	13,842	1,554	—
Hackney	-	-	-	-	-	-	270	-	-	-	-	2,945	-	-	4,991	300	-	320	6,185	730	—
Saint Giles	-	-	-	-	-	-	-	-	-	-	-	270	-	-	-	-	-	-	267	—	—
Holborn	-	-	-	-	220	-	-	-	-	-	-	250	-	-	-	-	-	-	90	—	—
Strand	-	-	-	-	20	-	-	-	-	-	-	405	-	-	-	-	-	-	440	—	—
Fulham	-	-	-	-	620	-	-	-	-	-	-	-	-	-	-	-	-	-	416	—	—
Limehouse	-	-	-	50	-	-	400	-	-	-	-	-	-	1,030	-	-	10	-	1,040	—	—
Poplar	-	-	-	-	974	-	-	-	-	195	-	4,319	-	-	1,524	-	-	720	3,639	1,663	—
Lewisham District	-	-	-	-	6,320	3,300	-	-	-	-	-	6,210	-	3,280	2,600	-	-	-	4,110	620	—
Rotherhithe	-	-	-	-	190	-	575	-	-	-	-	400	-	100	4,960	360	-	480	3,213	980	70
TOTALS	490	3,870	1,500	630	33,006	3,300	2,263	4,448	494	1,945	720	42,871	620	10,268	25,340	660	10	4,785	87,940	8,827	70

	Length in Feet.
1-Brick Sewers	45,059
Half-Brick ditto	87,416
Pipe ditto	101,622
	234,097 = 44 miles 1,777 feet.

Number of drains and branch sewers laid into main sewers, and the works superintended by this Board, 660.

10 June 1857.

J. W. Bazalgette, Engineer.

Table No. 4.

Applications from Vestries and District Boards for the Sanction of the Metropolitan Board of Works to their Borrowing Money upon the Mortgage of their Rates, under the 183d Section of the Metropolis Local Management Act, which have been sanctioned, between the 1st January 1856 and the 25th March 1857.

Date of Application for Sanction to Loan.	Date when Application was Granted by the Metropolitan Board of Works.	Vestry or District making Application.	Works proposed to be Executed out of Loan.		Amount of Loan Sanctioned.
			Length Brick Sewer.	Length Pipe Sewer.	
1856:	1856:	SEWERAGE WORKS:	*Feet.*	*Feet.*	£.
February -	18 April -	Lewisham District - - - - -	20,250	3,350	10,000
15 April - -	2 May -	Rotherhithe Vestry - - - - -	5,890	2,485	3,000
10 September -	24 October -	St. Matthew, Bethnal-green Vestry -	5,664	15,653	5,000
3 November -	25 November -	Lambeth Vestry - - - - - -	5,810	- - -	5,700
1857: 1 January -	1857: 30 January -	Wandsworth District - - - - -	4,928	4,361	3,500
			42,542	25,849	27,200
		PAVING WORKS:			
1856: 30 September -	1856: 12 November -	Lambeth Vestry - - - - - - - - - - - - -			4,500
1857: 21 January -	1857: 6 February -	Holborn District - - - - - - - - - - - -			3,000
			Total - - - - £.		34,700

10 June 1857.

J. W. Bazalgette, Engineer.

Superintending Architect's Report for 1856–57.

OUTLINE OF REPORT.

Officers of Department.
1. Architect and Clerks.

Building Act.
2. Jurisdiction.
3. Extent of Business.
4. Limits of Act.
5. Appointment of District Surveyors.
6. State of District and Fees.
7. Special and Deputy District Surveyors.
8. Chimney Shafts.
9. Special Buildings.
10. Public Buildings.
11. Forms and Notices.

New Streets and Improvements.
12. Southwark.
13. Covent Garden.
14. Middle-row, Holborn.
15. Oxford-street, and St. Luke, Old-street.
16. Victoria Park Approaches.
17. Commercial-street, Whitechapel.
18. Union-street, Deptford.
19. Fendall-street, Bermondsey.
20. Burr-street, Whitechapel.
21. Plans of Improvement.
22. Street Designs.
23. Width of Streets (Bye Law).
24. Street Nomenclature and Numbering.
25. Lines of Frontage.

Parks.
26. Rotherhithe and Bermondsey.
27. Finsbury.
28. Hampstead Heath.

Appendix.
29. Statement of Business.

Superintending Architect's Department,
1, Greek Street, Soho,
1 June 1857.

Gentlemen,

In obedience to your directions, I beg to submit the following statement of the transactions in my department, from January 1856 to June 1857, in carrying out the provisions of the Metropolis Local Management Act, and of the Metropolitan Building Act, so far as my duties are connected with them.

1. On the 4th of February 1856 I had the honour of being appointed by you to my present office of Superintendent Architect (created by the latter Act), "to perform the duties defined by, or which might be requisite for the purpose of enabling the Board to carry out the provisions of the Metropolitan Building Act; and to act as the professional adviser of the Board in all matters relating to the offices of district surveyors, and to questions of fees and compensations connected therewith; and generally on all matters on which the Board might require a professional opinion, and to perform all such other duties incident to the office as might be required." The salary was fixed at 800 *l.* The official assistants afforded to me were two gentlemen who had previously served in the Metropolitan Buildings Office, during the eleven years of its existence—

Mr. Walter Newall, as principal Clerk, at a salary of £. 200 – –
Mr. Henry Hart, as assistant Clerk - - - - 150 – –

afterwards appointed as Surveyor to verify plans, &c., accompanying applications to the Board, at a salary of 100 *l.* additional.

These gentlemen had been transferred from the late Office of Metropolitan Buildings by the present Building Act, sect. 114, for employment or compensation; and the other gentlemen from that office, who could not be employed, were compensated.

Afterwards, one draftsman assistant (Mr. T. A. Britton) was appointed at 100 *l.*; and a copying assistant (Mr. C. Y. Norwood) at 100 *l.*

2. By the Building Act of 1855, the former Acts (7 and 8 Vict. c. 84 (1844), and 9 Vict. c. 5 (1846), were repealed. The judicial business in settling differences, arising between builders and district surveyors, as to the application of the rules of the Act, was transferred to the police magistrates; while the Commissioners of Police for the Metropolis, or the Commissioners of Sewers in the City of London, were charged with the jurisdiction as to securing dangerous structures; and the county courts have the adjudication of matters arising out of arbitrations regarding party walls and the rights of adjoining owners. The administrative functions alone, for the superintendence of district surveyors, and the application of sundry special rules, were conferred upon the Metropolitan Board of Works, as set forth in a Report from the superintending architect, defining the duties of the Board under the Building Act. These duties I shall proceed first to notice, and afterwards those arising out of the Local Management Act.

3. In the course of the general business of this department, various papers have been received and sent out, from 1st January 1856 to 1st June 1857, which may be classed under the following heads:

Papers received.

Such as applications, drawings and relative correspondence; returns by district surveyors; notices, and miscellaneous matters.

Papers sent out, and Official Reports.

Correspondence, and intimations of the decisions of the Board; various circulars; reports to the Board upon applications, and other matters; besides plans, surveys, and estimates for metropolitan improvements. [*The details of correspondence, &c., will be found in the Appendix, at page* 43.]

4. The local limits of the powers of the Board under the Building Act, being co-extensive with those under the Local Management Act, two districts—Hornsey and Tottenham—to which the latter Act does not apply, were found to be excluded from the operation of the Building Act, although within the operation of the Act of 1844; and in consequence Mr. Rawlinson Parkinson and Mr. J. H. Taylor, the surveyors of those districts, lost their appointments. Three other localities were included in the Local Management Act, and therefore in the Building Act, which had not before been subject to building regulations. These new localities were Putney, including Roehampton, Plumstead with Eltham, and Penge; of which three districts were formed, and surveyors appointed thereto.

5. On the death of Mr. George Porter, surveyor of the district of St. Mary Newington, the central division of Lambeth, and the northern division of

Battersea, the Board appointed Mr. John Henry Taylor, the surveyor of Hornsey district under the late Act, to the vacancy, "subject to the condition, that no claim for compensation shall be made by the district surveyor in case a diminution of income should at any time hereafter arise from any reduction or alteration of fees by the Board or otherwise."

6. By the 32d section of the Building Act, the Board have power, by order, at their discretion to alter the limits of districts or unite any two or more districts, and may place any altered district under the supervision of any existing or future district surveyor. They may also, from time to time, alter any district so made, and do all matters or things necessary for carrying into effect this power; but hitherto they have not deemed it advisable to disturb any existing arrangements. It would appear, however, from the state of the business and incomes in many of the districts, as shown by the monthly returns made by the several district surveyors for the year 1856, that these matters will require the attention of the Board.

The following List shows the total incomes received, as stated in the Report presented to the Board on the 17th March 1857, on the examination of the district surveyor's returns for the year 1856 :—

LIST of the Gross Totals of FEES received by the SURVEYORS of the several Districts, under the Metropolitan Building Act, arranged according to Value.

Expenses marked * include house taxes; in other cases these excluded as not being definitely returned.

GROUPS.	Serial Number in List.	DISTRICT.	Gross Fees Received.			Office Expenses.			Net Revenue.		
			£.	s.	d.	£.	s.	d.	£.	s.	d.
Sixteen Districts, under 200 l. each, 2,036 l. 15 s. 9 d.	50	Putney and Roehampton (9 months)	27	9	6	25	–	–	2	9	6
	46	Penge - - - - - - - ditto	51	5	6	17	7	4	33	18	2
	28	Tower Liberty	47	5	6	21	1	–†	26	4	6
	39	Rotherhithe and Hatcham	75	17	8	46	–	–	29	17	8
	33	Stoke Newington	82	3	9	20	2	6	62	1	3
	9	St. Paul, Covent-garden, &c.	105	3	–	70	–	–*	35	3	–
	25	St. George-in-the-East	109	10	–	40	–	–	69	10	–
	47	Streatham	122	10	–	17	10	–	105	–	–
	20	Holborn, &c.	132	9	–	35	–	–*	97	9	–
	6	St. James, Westminster	143	2	9	64	–	–*	79	2	9
	43	Plumstead and Eltham (9 months)	187	18	6	84	–	–	103	18	6
	19	St. Giles and St. George, Bloomsbury	189	2	9	27	–	–	162	2	9
	21	Saffron-hill, &c.	189	15	8	32	10	–*	157	5	8
	48	Clapham and South Battersea	189	16	9	45	–	–	144	16	9
	42	Charlton, Lee, and Kidbrook	189	19	9	37	–	–	152	19	9
	26	Whitechapel	193	5	6	33	12	–	159	13	6
Eleven Districts, under 300 l. each, 2,899 l. 13 s. 11 d.	27	Spitalfields	202	6	8	14	10	–*	187	16	8
	7	St. Martin-in-the-Fields and Soho	232	3	9	- none -			232	3	9
	29	Limehouse, &c.	244	11	9	57	–	–	187	11	9
	44	Woolwich	253	16	–	109	5	5	144	10	7
	4	Northern Division of City	264	18	3	115	–	–	149	18	3
	23	Bethnal-green	266	14	3	80	10	–	186	4	3
	8	St. Margaret and St. John, Westminster	276	2	9	50	–	–*	226	2	9
	52	Hammersmith	283	6	6	142	3	–	141	3	6
	53	Chelsea	284	18	–	88	–	–	196	18	–
	35	Newington, &c.	295	8	–	- no return ‡			295	8	–
	51	Fulham	295	8	–	17	10	–*	278	18	–
Twelve Districts, under 400 l. each, 4,14 l. 7 s. 9 d.	41	Greenwich	302	13	6	133	–	–	169	13	6
	11	North Saint Marylebone	308	12	–	114	12	–*	194	–	–
	49	Wandsworth and Tooting	310	7	3	64	2	2*	246	5	1
	18	St. Luke, Old-street, &c.	313	19	6	60	–	–	253	19	6
	1	Eastern Division of City	317	19	9	90	–	–*	227	19	9
	54	South Kensington	321	8	3	115	10	8*	205	17	7
	2	Southern Division of City	323	14	3	- no return -			323	14	3
	3	Western Division of City	384	–	3	176	10	–	207	10	3
	15	East Islington	386	1	9	157	–	–*	229	1	9
	10	South Saint Marylebone	387	17	6	140	–	–*	247	17	6
	24	Mile End Old Town	392	14	6	90	–	–*	302	14	6
	38	Southwark, &c.	399	19	3	55	–	–*	344	19	3

† No rent.

‡ Mr. Porter died in beginning of September.

(continued)

List of the Gross Totals of Fees received by the Surveyors of the several Districts, &c.—*continued.*

GROUPS.	Serial Number in List.	DISTRICT.	Gross Fees Received.			Office Expenses.			Net Revenue.		
			£.	s.	d.	£.	s.	d.	£.	s.	d.
Seven Districts, under 500 *l.* each, 3,089 *l.* 2 *s.* 8 *d.*	17	Clerkenwell - - - - -	410	17	6	48	–	–	362	17	6
	34	Lambeth (South Division), &c. -	413	9	11	113	–	–*	300	9	11
	36	Camberwell - - - - - -	414	6	–	169	10	–	244	16	–
	45	Lewisham, D. S. - - 399 *l.* 18 *s.* Int^{m}. D. S. - - 35 *l.* 14 *s.*	435	12	–	165	–	–	270	12	–
	31	Bromley - - - - - -	436	14	3	152	9	6*	284	4	9
	37	Bermondsey, &c. - - - - -	485	19	9	96	1	9*	389	18	–
	55	North Kensington - - -	492	3	3	146	11	4	345	11	11
Nine Districts, from 500 *l.* to nearly 1,000 *l.* each,— £. s. d. 6,411 17 3 One - 1,317 17 9 £. 7,729 15 -	56	Hampstead - - - - - -	504	8	–	149	12	–	354	16	–
	40	Deptford - - - - - -	571	1	6	100	15	–	470	6	6
	14	West Islington - - - - -	590	11	3	70	1	8	520	9	7
	13	Paddington - - - - - -	707	19	6	160	–	–*	547	19	6
	32	Hackney - - - - - -	709	14	9	273	–	–	436	14	9
	5	St. George, Hanover-square - -	726	9	3	250	–	–*	476	9	3
	16	South Islington - - - - -	727	9	9	196	11	–	530	18	9
	22	Shoreditch and Folgate - - -	917	9	9	172	10	–*	744	19	6
	30	Bow and Poplar - - - - -	956	13	6	125	–	–*	831	13	6
	12	Saint Pancras - - - - -	1,317	17	9	- none -			1,317	17	9
		£.	19,904	14	11	4,872	17	8	15,031	17	3

The above fees were received in respect of buildings, as follows :

	Building Operations.	Fees.		
		£.	s.	d.
New buildings in 1856 (but exclusive of buildings for which the fees were not received) - - - - - - -	3,445	4,936	4	5
Additions, alterations, and other works - ditto - -	4,975	5,152	13	3
Total under New Act - - -	8,420	10,088	17	8
Arrears under Building Act of 1844 (but exclusive of buildings for which the fees were not received) - - -	6,234	9,815	17	3
Total of Works, and Fees received during the Year ending 31 December 1856 - -	14,654	19,904	14	11

From this list it appears—

1. That in 16 districts the fees do not exceed 200 *l.* each, five of which are under 100 *l.* each, and from which amount the expenses of office have to be deducted, thus making them considerably smaller.

2. That in 11 districts the fees do not exceed 300 *l.* each.

3. That in 12 districts the fees do not exceed 400 *l.* each.

4. That in seven districts the fees do not exceed 500 *l.* each; and

5. That in nine districts the fees vary from 500 *l.* to nearly 1,000 *l.*, and one only reaches 1,317 *l.*

The expenses attending the business of a district surveyor are considerable, amounting, for the whole 56 districts, to 4,872 *l.*, or nearly one-fourth of the gross revenue. It is also worthy of remark, that the large amount of fees remaining due (8,927 *l.*) at the end of 1856, and the sum (1,756 *l.*) lost partly by bankruptcy, and abated from the legal amount of fees chargeable, clearly indicate the difficulty with which the fees are recovered; and it is to be regretted that when the law was altered some more effectual remedies had not been provided to enable the executive officers to secure that remuneration for their services to which they were legally entitled.

Comparing the amount of the fees under the old Act with that under the present Act, as far as received in 1856, it would appear that the average under the latter, on 8,420 building operations, was 24 *s.* nearly; whilst under the former, the average on 6,234 building operations was 32 *s.* nearly. This shows a diminution of one-fourth, or 25 per cent. on the fees under the Act of 1855, as contrasted with those under the former Act.

Fees are payable to the district surveyors according to schedule, or fees of less amount may be directed by the Board, and if the income of any district surveyor is thereby diminished, the Board may grant compensation for the diminution (section 49); but this question of compensation renders it extremely difficult for the Board to effect any alteration or adjustment of the district surveyors' fees, or of the limits of existing districts, and the powers given by sections 32 and 49 are therefore almost null. Fees for special services performed by a district surveyor under the first part of the Building Act may be ordered by the Board (section 50); and the Board deemed it desirable to exercise these powers for the revision of the table of fees, as the audit of the monthly returns made by district surveyors showed that the rules in the schedule, according to which fees are chargeable, were in some respects very variously interpreted, and led to charges upon the public, which the Board considered some of those rules did not fairly warrant; but these rules appeared so vague and undefined, that the Board were unable to effect the desired adjustment of the present schedule. A new table of fees was therefore prepared, and submitted to the consideration of Mr. Attorney-General (Cockburn) early in 1856, and the Board were advised by him that the powers given by the statute were not sufficient to remedy the anomalies of the present table of fees, and that they should go to Parliament for further powers, as in his opinion the Board required greater latitude of discretion with regard to fees.

In regard to another class of fees under the second part of the Building Act for supervising dangerous structures (sections 77 and 78): the Board have ordered fees for special services performed by the district surveyors in the City of London, and by the engineer and surveyor of the Commissioners of Sewers for the City, on the application of the latter officer. The services and fees in such cases have been:

> For directing the hoarding and shoring of dangerous structures, and surveying on the completion of works, and certifying contractors' bills, and reporting to Commissioners.
>
> For attending before the magistrate, giving evidence in respect to dangerous buildings.

In other cases of special services performed by the surveyor to the Commissioners of Metropolitan Police, similar fees have been ordered.

The returns of fees, amounting to 168 separate accounts, received every month from the several district surveyors, have been duly audited and reported on to the Board, periodically, as directed by section 54.

7. When a district surveyor, under the Building Act, is employed to act professionally in regard to any works within his district, he is required to give notice to the Board, under section 37, in order that they may appoint some other surveyor to act in respect of such matter. Of such appointments 41 have been made in 21 districts, up to the present time. Also on four occasions the Board have consented to the appointment of deputies by district surveyors, on account of ill-health, or temporary absence, as provided for in section 35 of the Building Act; and on the death of the surveyor of Newington, Lambeth, &c., an interim surveyor was appointed until the vacancy was filled up.

8. Finding that an uncertainty prevailed amongst builders and others, as to the necessity for the approval of furnace chimney shafts, under the Building Act, in the same manner as they had formerly been approved by the official referees, and this being favoured by the terms of exception of "the furnace chimney-shaft of any steam-engine, brewery, distillery, or manufactory," from a rule in section 20 of the Building Act, by which ordinary chimneys are restricted in height, the Board, after due consideration of so serious a matter, and finding that there were no rules for the construction of furnace chimney-shafts (a class of buildings obviously demanding more than ordinary care), resolved that all such buildings were of an especial nature, and that they fell under the provisions of the 56th section, and they made and issued a regulation to the following effect:

"That all builders, or other persons who may be desirous of erecting any chimney-shaft of a steam-engine, brewery, distillery, or manufactory, the same being buildings to which the rules of the Metropolitan Building Act, 1855, are inapplicable, shall, before commencing any such building, make an application to this Board, requesting their approval thereof, setting out a plan of the proposed building, and such other necessary particulars as may be required by the Board (section 56, Metropolitan Building Act, 1855)." And the supervision of such works by the district surveyor, being of the nature of a special service, the Board further ordered that special fees should be payable in respect thereof; "and that the following fees be demanded and received by every district surveyor under the Metropolitan Building Act, 1855, who shall perform any of the services hereinafter enumerated, the same being special services required to be performed under the first part of the Metropolitan Building Act, 1855, for which no fee is specified in the first part of the second Schedule to the Act, viz.:

For the Supervision of Furnaces and Chimney-shafts.

	£.	s.	d.
For every furnace, and chimney-shaft belonging thereto, not exceeding 75 feet in height	1	10	–
Not exceeding 100 feet	2	–	–
For every 10 feet in addition, up to 150 feet	–	2	6
For every 10 feet in addition, above 150 feet	–	5	–"

Under these arrangements many applications for approval have been made to the Board; and the rule is found to work well, the approval of the Board being given, subject to the circumstances of each case, which are always fully reported upon and described in the reports of the superintending architect. In general, the designs submitted are satisfactory; but occasionally, where mere bricklayers have been employed to fix a boiler and build a shaft, or where cheapness has been the primary object, and stability and public safety not duly regarded, the applications have been rejected. Of this class there have been 10 cases, which were afterwards put into other hands, or amended. The chimney-shafts approved have been 87.

9. Under section 56 of the Building Act, provision is made for the approval of iron buildings, and all other buildings to which the rules of the Act are inapplicable. Several buildings of this nature have been permitted for workshops, temporary churches, sheds, &c.; and some buildings have been allowed to be constructed of timber, such as travelling cranes, floor-cloth manufactories, &c., being buildings where much vibration was occasioned by the nature of the operations carried on. In rural neighbourhoods, garden sheds, summer houses, and poultry-houses have been allowed, under special circumstances, to be erected of wood. Buildings have also been approved for stables, coach-houses, tanneries, &c., requiring by their nature a greater opening than is allowed by the Act for ordinary buildings, under section 13, by which the openings and recesses taken together must not exceed one-half of the area of the wall in which they are made; a rule that, in very many cases, would be found to be extremely harsh and impracticable if strictly enforced. For the regulation of such matters, the Board have made general rules.

10. Public buildings, such as churches, chapels, or other places for public worship; buildings used for the purposes of public instruction; buildings used

as colleges, public halls, hospitals, theatres, public concert rooms, public ball-rooms, public lecture rooms, public exhibition rooms, or for any other public purposes, including the walls, roofs, floors, galleries, and staircases, are to be constructed in such manner as may be approved by the district surveyor (section 30); or, in the event of disagreement, may be determined by the Metropolitan Board of Works; and otherwise every such building is subject to the rules of the Act. Five cases of this sort have arisen, two of which were determined by the Board, and three were withdrawn, the disagreement having been adjusted between the parties.

It is understood that the important duty thus placed in the hands of the district surveyors, and formerly discharged by the official referees of metropolitan buildings, under the Act of 1844, has been performed by the aid of a committee of district surveyors; but as to the nature and extent of their duties, this Board has no information, such cases only coming to their knowledge as are brought before them for determination when the difference arising between the district surveyor and the builder, or architect, cannot otherwise be settled.

11. The powers given to the Metropolitan Board of Works to issue forms of notices required by the Act (section 59), and forms of returns to be made by the district surveyor (section 52), have been duly exercised, the returns being all made on the forms ordered by the Board; and with regard to notices, by the issue of the following forms:

1. By builders to district surveyors, as to works to be executed (section 38), with instructions for use relative to new buildings, additions, or alterations, resumption of works after suspension for three months, or change of builder.

2. By district surveyors to builders (section 45), of works not conformable to the rules of the Act, embracing works done contrary to the Act, and to be amended; works required to be done by the Act, but omitted; works to be cut into, laid open, or pulled down, to ascertain the nature of the works executed. Instructions are also thereto annexed.

3. By a building-owner to an adjoining owner (section 83), as to party structures, with instructions for use.

4. By an adjoining owner to a building-owner (section 84), for the protection of his rights, with instructions for use.

12. The crowded and dangerous state of the traffic in some of the main thoroughfares in the City, and on the Southwark side of the river, towards the railway stations at London Bridge, early demanded the attention of the Board to provide some remedy, either by the construction of new streets, or the improvement of existing communications, under the powers given by the 144th section of the Metropolis Local Management Act, to make, widen, or improve any streets, roads, or ways for facilitating the passage and traffic between different parts of the metropolis.

As the improvement of Southwark, by opening up a new street from the vicinity of the railway stations to the several bridges and the West-end, had been long contemplated, and funds, being special grants from Parliament with accumulations of interest since 1841, being partly provided for that specific purpose, the Board proceeded first to consider the wants of that locality. All the plans that had been from time to time proposed, as different means of opening the thoroughfare from the High-street in Southwark towards Westminster Bridge were considered; and a plan prepared by Mr. Pennethorne, and laid before Her Majesty's Commissioners of Woods and Works in 1853, appearing at first to possess great advantages over all others, a detailed plan and estimate were ordered to be prepared. This line commenced at Northumberland-street, in the Strand, and proceeded on the line of the Hungerford Bridge until it reached the York-road, where, by a slight curve, it joined a perfectly straight line from the corner of the churchyard of St. John's Church in the Waterloo Road, to the Town-hall in the Borough. The cost of the portion of the line between the High-street and the York-road, was estimated at 895,104 *l.*; the return 631,794 *l.*; the net cost, less Government grant of 90,000 *l.*, 173,310 *l.*

There were other plans having the same object in view, namely, the improvement of the thoroughfares in Southwark referred to by Mr. Tite before the Committee of the House of Commons on the 4th of May 1855, but which only provided for widening the present line of Charlotte-street and Union-street, between the Blackfriars-road and the High-street; that of Mr. George Ledwell Taylor, referred to before the Committee of the House of Commons on the 10th and 17th May 1855; and that of Mr. Bailey, both following nearly the same line as that above detailed, but the latter having reference more particularly to a railway station on the Thames, on the site of the present Hungerford Bridge. A plan by Mr. Wade takes somewhat the same line from the High-street to the Waterloo-road, whence it runs off by a curve to the foot of Westminster Bridge. Mr. T. Taylor projected another line nearer the river, but there were difficulties in the way of the execution of that line that could only have been overcome at a very heavy expense.

When, however, the line originally projected by Mr. Pennethorne was fairly before the Board in detail, there appeared many serious objections to it. It did not take up the line of Stamford-street, so clearly pointed out by the Act of Parliament making the first grant of 30,000 *l.* towards opening a communication between Southwark and Westminster, "by way of Stamford-street." It did not appear to the Board sufficiently to tie the bridges together, so as to take the utmost advantage of them; and the Board were fearful, and with much reason, that the ground on so long a line of street would probably remain long unoccupied, the capital employed unprofitable, and the road itself a waste; and with the example of Victoria-street, Westminster, before them, they deemed it expedient to adopt a shorter line by which less property would be destroyed, particularly among the dwellings of the working classes, and one where they might reasonably expect to realise the ground rents within a few years. Other surveys and estimates were prepared, both starting from a point in the Blackfriars-road opposite to the end of Stamford-street, and terminating in Wellington-street, Borough, at the corner of York-street, nearly opposite the South Eastern Railway station. One of the lines, although much straiter than the other, was found to interfere with some properties of great value and very difficult to deal with, showing an estimated cost of 737,300 *l.*, less a probable return of 195,585 *l.*, leaving a net cost of 541,715 *l.* The other line, lying a little to the south, although presenting a considerable curve on the plan, showed few disadvantages, and was estimated to cost 519,424 *l.*, less probable return 198,753 *l.*, the net cost, after deducting the Government grant of 90,000*l.*, being 230,671 *l.* This line was ultimately adopted by the Board, and is now before Parliament.

13. A new street having been long contemplated, to open up a communication from St. Martin's-lane at the point of intersection by Long Acre and Cranbourn-street, and thence running in a south-easterly direction and terminating at the north-west end of King-street, Covent Garden, in June 1856, a correspondence passed between the First Commissioner of Her Majesty's Works and Public Buildings and the Metropolitan Board of Works; and as it appeared that a surplus would remain of the fund called the London Bridge Approaches Fund, after the payment of all existing charges upon that fund, which surplus was to be applied to carrying out the improvement above mentioned before it could be applied to any other purpose; and as it further appeared that His Grace the Duke of Bedford was willing to contribute 15,000 *l.* towards the same object, the Board directed the superintending architect to report upon this subject. A survey and estimate were accordingly made, and the line adopted which had been proposed by Mr. Pennethorne, and referred to in the Seventh Report of the Metropolis Improvement Commissioners. The outlay for this line of street, 135 yards in length, is estimated at 91,820 *l*; the return at 46,800 *l.*; and the net cost 45,020 *l.* This plan is included in the Bill now before Parliament, in order that the funds previously provided may be transferred to the Board to enable them to execute the works.

14. In the beginning of May 1856 the Board of Works for the Holborn district memorialised the Metropolitan Board, relative to the removal of the block of houses known as Middle-row, Holborn, and as to several other suggested improvements within the same district; and the Committee of Works having

investigated the subject, reported, that it was important to effect the removal of Middle-row at the earliest possible period. A plan and estimate were accordingly prepared, and laid before the Board. The cost of the property, including all interests, good-wills, &c., was estimated at 46,625 *l.* The estimated cost of this improvement, not exceeding 50,000 *l.* (the limit of works to be undertaken by the Board without further authority), they have instructed the architect, in conjunction with the solicitor, to endeavour to effect conditional arrangements for the purchase of the property, without incurring the expense of a Bill in Parliament.

15. As it appeared that much of the traffic from the West-end of the Metropolis, towards the Eastern Counties Railway, and the Kingsland, Hackney, and City-roads, Shoreditch, Bethnal Green, and St. Luke's might be diverted from the Strand and City thoroughfares by opening a thoroughfare or making a new street, in as direct a line as practicable, from the end of Old-street to the new street from Farringdon-street to Clerkenwell, the matter was referred to the Committee of Works and Improvements for investigation and report. In accordance with this reference, a plan and preliminary Report were prepared by the superintending architect, and submitted to the Board in February last, recommending the opening of a continuous line of thoroughfare from the end of Old-street, St. Luke's, to Hart-street, New Oxford-street, by rebuilding and setting back the houses on the one or other side of the narrow parts of the line, and forming a portion of a new street from the end of Wilderness-row to Clerkenwell-green, near the Sessions House, and cutting another short opening through Lower Saffron-hill and Back-hill; by which means a wide and continuous thoroughfare would be secured at a comparatively small cost, considering the importance of the object and the great advantage it would be to the public. This matter awaits the further consideration of the Board; the architect having been instructed to prepare a detailed survey and estimate of the whole line.

16. The vestry of the hamlet of Mile-end Old-town, and the Boards of Works for the districts of Poplar and Limehouse, in July 1856, memorialised the Board to cause a new road to be constructed from Limehouse to Mile-end-road, so as to form a junction with Grove-road, and to widen the latter, with a view of affording a better access to Victoria Park. This matter has been much considered in the localities, and also by the committee of the Board, to whom it was referred, together with two other lines that were suggested by some of the inhabitants of Ratcliff, &c. The subject is still under the consideration of the committee, who have directed a survey of a line proposed by the superintending architect to be made, as that line appears to possess some advantages over the others.

17. Another short line of communication between the Commercial-road and Whitechapel is also under the consideration of the Board, and the necessary surveys are now in hand. This will be the completion of the improvement undertaken by the Government some few years ago, and will be of great benefit to the traffic in this locality.

18. The inhabitants and owners of property in Union-street, Deptford, having arranged amongst themselves to subscribe money and property to remove certain old houses which encroached upon, and obstructed the line of street, applied to the Local District Board of Greenwich, who submitted their concurrence therein to this Board for co-operation and assistance, under the 144th section of the Metropolis Local Management Act, as the improvement would very greatly tend to facilitate the traffic in that street. The whole money expenditure would not exceed 150 *l.* The Board, therefore, under the powers given them by the 144th section, to make, widen, or improve any streets, &c., or to contribute and join with any persons in any such improvements, and to take by agreement, or by gift, any land, rights in land, or property for such purposes (or otherwise) for the improvement of the metropolis, on such terms and conditions as they think fit, entered into the proposed arrangements for effecting this improvement, which has been carried out accordingly.

19. The vestry of Bermondsey applied to the Board in November last, relative to the purchase of premises in Fendall-street, under the powers contained in

section 144, for the purpose of widening that street, the cost of which would not exceed 160*l*. In the consideration of this proposition the opinion of the clerk of the Board was obtained as to the power of the vestry to raise any sum which the Board might require them to contribute towards the improvement in question, and generally as to the powers of vestries and district boards as regards the raising of funds for local improvements. In that opinion the clerk stated, that "there were valid grounds for the opinion that the vestry or district board of any parish or district within the limits described in the General Paving Act (57 Geo. 3, c. 29, 1817), namely, the city of Westminster and borough of Southwark, the parts within the bills of mortality, and the parishes of St. Pancras and St. Marylebone (excepting certain estates in St. Pancras, and the parishes of Islington and Hackney), are empowered to take houses and lands by agreement for improving the streets of that particular part of their parish or district which comprises the area, or part of the area, defined by the former Local Act; to pay for them by moneys raised on that area, and to execute the necessary works themselves; and that it is competent to this Board, under the 144th section of the Metropolis Local Management Act, to contribute to their cost." On the matter being thereafter discussed, the Board resolved to contribute one-third of the estimated expense of purchasing the premises as proposed.

20. A plan for the improvement of Lower East Smithfield, at the corner of Burr-street, Whitechapel, was lately submitted to the Board, proposing to add a slip of ground (varying from 10 ft. 6 in. to 5 ft. 6 in.), to the public way, by the setting back of a warehouse about to be rebuilt. The street being near St. Katherine's Docks, and often crowded with carts and waggons loading or unloading at the warehouses on either side, every foot of space becomes of great importance to the thoroughfare; and the Committee of Works and Improvements, to whom the subject was referred for report, have recommended the Board to contribute a portion of the cost of such improvement, as, should the warehouse be rebuilt on its old site, any widening of the street at a future time would be attended with very great expense, if not altogether impracticable.

21. According to the order of the Board in March 1856, there is in preparation a plan of the metropolis on the large Ordnance scale of five feet to a mile, showing all proposals for new streets mentioned in the Reports of Committees of the House of Commons on Metropolis Improvements. This plan also embraces the communications in the metropolis by means of the bridges over the Thames, with reference to the increasing traffic, and the best mode of improving the approaches and communications, which questions are now before a committee of the Board.

22. Shortly after the Board had determined that new streets should be formed in Southwark and near Covent Garden, they took measures for inserting in the Bill to be laid before Parliament a clause giving the Board power to deal with the subsoil of the new streets in the construction of subways, if deemed advisable, and to retain or dispose of the property in the subsoil, in order that an opportunity might be afforded of endeavouring to obviate the constant necessity of breaking up the pavement whenever it was desired to get at any of the gas or water pipes; and advertisements have been issued, offering liberal premiums for designs for the best method of so disposing of the sewers, gas, and water pipes, and any other useful suggestions that may be proposed by competitors for laying out the ground beneath the surface of the streets.

23. Early in the experience of the Board it became necessary to enact a bye-law to regulate the width of new streets in the metropolis, as the rules that had existed under the former Building Act were not re-enacted in the present Act, and parties were proceeding to lay out ground for streets and alleys of less than the accustomed width. The rules of the former Act were therefore re-enacted as a bye-law, in pursuance of the powers vested in the Board by the Local Management Act; but, as something more complete was still required, especially as regarded the mode of measurement, and to secure the full minimum width of thoroughfare, independent of any gardens, areas, or other open spaces, the bye-law was revised, and, after much consideration, was finally confirmed by

the Board; and, having been approved by the Secretary of State, it became law on the 1st of May 1857, as follows:

1. Four weeks, at the least, before any new street shall be laid out, written notice shall be given to the Metropolitan Board of Works, at their office, No. 1, Greek-street, Soho, in the county of Middlesex, by the person or persons intending to lay out such new street, stating the proposed level and width thereof, and accompanied by a plan of the ground, showing the local situation of the same.

2. Forty feet, at the least, shall be the width of every new street intended for carriage traffic; 20 feet, at the least, shall be the width of every new street intended only for foot traffic. Provided that the said width respectively shall be construed to mean the width of the carriage and footway only, exclusive of any gardens, fore-courts, open areas or other spaces in front of the houses or buildings erected or intended to be erected in any street.

3. Every new street shall, unless the Metropolitan Board of Works otherwise consent in writing, have at the least two entrances of the full width of such street; and shall be open from the ground upward.

4. The measurement of the width of every new street shall be taken at a right angle to the course thereof, half on either side from the centre or crown of the roadway to the external wall or front of the intended houses or buildings on each side thereof; but, where forecourts or other spaces are intended to be left in front of the houses or buildings, then the width of the street, as already defined, shall be measured from the centre line up to the fence, railing, or boundary dividing, or intending to divide, such fore-courts, gardens, or spaces from the public way.

5. The carriage-way of every new street must curve or fall from the centre or crown thereof at the rate of three-eighths of an inch, at the least, for every foot of breadth.

6. In every new street the kerb to each footpath must not be less than four nor more than eight inches above the channel of the roadway, except in the case of crossings, paved or formed for the use of foot-passengers; and the slope of every footpath towards the kerb must be half an inch to every foot of width, if the footpath be unpaved, or not less than a quarter of an inch to every foot of width if the footpath be paved.

7. In this bye-law the word "street" shall be interpreted to apply to and include any highway (except the carriage-way of any turnpike road), and any road, public bridge (not being a county bridge), lane, footway, square, court, alley, or passage, whether a thoroughfare or not; and a part of any such highway, road, bridge, lane, footway, square, court, alley or passage.

8. In case of any breach of the regulations contained in this bye-law, the offender shall be liable for each offence to a penalty of forty shillings; and, in case of a continuing offence, to a further penalty of twenty shillings for each day after notice thereof from the Metropolitan Board of Works.

By this law, the Board will be enabled to exercise some control over the very irregular manner of laying out ground for building purposes in the metropolis which has long prevailed; and to secure the requisite width of thoroughfare independent of gardens or other spaces in front of houses.

24. The powers given to the Board by the 141st section of the Local Management Act to name new streets, and to rename existing streets, where more than one street in the metropolis is called by the same name, have been acted on to a certain extent, the Board having, in April 1856, referred the matter to a committee, with instructions to communicate with the Post Office and other authorities thereon, and to report upon the subject to the Board. A correspondence was opened with the several vestries and district boards under the Local Management Act with a view of obtaining correct lists of the names of streets in the several localities of the metropolis; and lists were received from many. The secretary to the Post Office also expressed the anxiety of the Postmaster-general to obtain a reform of the street nomenclature of London, by doing away with the multiplication of the names for streets now carried to a perplexing extent, especially if accompanied by a more accurate numbering of houses, as a means of promoting the expeditious and correct sorting and distribution of letters. The subject has been noticed in several reports by the Postmaster-general to Parliament; and it appears that the clause was inserted in the statute through the instrumentality of Lord Canning, when Postmaster-general, in order to have the power vested in some central authority, in the hope that it might be exercised on some comprehensive and general principles.

The matter having thus far proceeded, was taken up in committee by Mr. D'Iffanger, a member of this Board, with great zeal and ability, a report was produced, and ordered to be printed, on the 12th December last.

From detailed lists furnished by the Post Office authorities, it appears that "there are in the metropolis 571 streets, designated by 17 names only, and that of one of these names there are no fewer than 62 repetitions, scattered over the various districts. This of itself shows the enormous amount of inconvenience, loss of time, and waste of labour, that must inevitably arise, both in the delivery of letters and the transaction of the daily business of the community, from a practice so replete with all the elements of confusion and mistake."

The Board, desiring to proceed with caution in the performance of this very difficult duty, have selected the New-road, in the parishes of St. Marylebone and St. Pancras, for the first alteration of name as an experiment, and have determined that the portion of the New-road between Edgware-road and Osnaburgh-street be called Marylebone-road; the portion between Osnaburgh-street and King's-cross, be called Euston-road; and the portion between King's-cross and the Angel Inn, at Islington, be called Pentonville-road; and that all the separate names of places, at present existing in the line of the said New-road, be abolished. This operation will substitute three names for 50.

On the application of the inhabitants of other parts of the metropolis, the Board have ordered the change of other names, subject (pursuant to the statute) to the approval of the Commissioners of Her Majesty's Works and Buildings. The several names of Clarke's-place, Hedge-row, York-buildings, Gloucester-place, Oddy's-row, Islington-green, Frederick's-place, Commerce-row, Barnsbury-place, Upper Barnsbury-place, Trinity-row, Hopkin's-buildings, San's-buildings, Sebbon's-buildings, and Wells-row, on the west side of Upper-street Islington, are to be abolished; and the whole of the west side of such street from the Liverpool-road to Holloway-road, is to be called Upper-street, Islington.

Notice of these changes, and of the date when such alterations will take effect, will be given by public advertisement, and also by circular letter, served on the several occupiers; and such names will be accordingly affixed on conspicuous parts of some houses or buildings in such places, and notices then served on the several occupiers of the houses and premises, directing them to mark the same, within one week after notice, with the proper numbers, agreeably to the order of the Board.

"Still greater errors arise from the imperfect numbering of houses than from the multiplication of streets bearing the same name. The returns received from the various district Boards, show to how large an extent this evil prevails. In the parish of St. George-in-the-East alone, there are 81 streets irregularly numbered, and 40 streets contain houses without numbers. St. Mary, Rotherhithe, returns 69 streets incorrectly numbered, and 32 not numbered. The Post Office authorities have also furnished a return showing that the great thoroughfare of Oxford-street affords a striking example of incorrect numbering, and one which must, not only cause great inconvenience to the public, but present to a postman, new to the beat, a vast amount of difficulty, and lead to errors, requiring the labour of weeks to correct. In this street there are 54 houses without numbers painted on them. and 23 without numbers at all. Many parts of the street are numbered in all diversities of repetition and irregularity."

"Although such anomalies are very injurious, the large extent of the work must prevent any general interference with the numbering of those streets in which no alteration is proposed in the names; and it would not be desirable to commence the renumbering of any street until its name has been determined on by the Board. In conformity with a suggestion of the Post Office authorities, the numbering of all new streets,—of all streets to which new names shall be given,—of the New-road (in connexion with other changes to be made therein), and of all streets named after others in the same line,—the odd numbers will be placed on the left hand, and the even numbers on the right, commencing always at the end nearest to St. Paul's Cathedral." Other expedients may be adopted to facilitate the ascertaining of the direction in which streets run and intercommunicate.

Difficulties may attend the transition period of these alterations, but experience indicates that they will be more imaginary than practical, as the operations ordered by the Board will be duly recorded and a careful register kept, as required by the 142d section of the Local Management Act, which may be easily referred to. The reading of the names on the street corners will for a few years be accompanied with the old names in a minor position, and proprietors of Directories may be induced to follow the same course until the public have become familiarised with the alterations.

The Post Office authorities state that it is of great importance to the Post Office service to have the names of streets clearly and frequently exhibited, as there are about 900 letter-carriers, daily engaged in the delivery of letters within the town limits alone of the metropolis. In a force of this number, constantly exposed to the changes of the weather, there are many casualties which must be supplied by other letter-carriers, comparatively unacquainted with the localities on which they are called to serve; and unless the names of the streets are distinctly marked these substitute letter-carriers lose much time in acquiring the necessary knowledge—familiar enough to the regular men—but otherwise very perplexing and difficult for strangers to find out.

The Postmaster-general in his third Report to Parliament (1856–7), notices that it would not suffice to add the locality to the duplicate names now existing, such as King-street, Cheapside, King-street, Covent Garden, for "the necessity for such distinction is frequently unknown, especially by persons living at a distance, and in fact it is in numerous instances disregarded. Not only should the names of no two streets be identical, but the distinction between them should be broad and clear. Repeated complaints have been made in the neighbourhood of Westbourne-terrace, on account of delays in delivering arising from the great similarity in several of the names thereabout; such as, Westbourne-park-cottages, Westbourne-park-crescent, Westbourne-park-place, Westbourne-park-road, Westbourne-park-terrace, Westbourne-park-villas."

25. That feature of the suburban metropolis, which has added so much to the width and beauty of its approaches in many parts,—viz., the formation of gardens and open spaces in front of houses in the main thoroughfares, has also created much inconvenience when the necessity arose of forming shops or places for business in such localities. Hence, much local and general legislation has been, from time to time, directed to control the erection of buildings beyond the regular lines of buildings, and also shop fronts and other projections from such buildings. The Metropolitan Paving Act of 1817 contains stringent provisions relative to projections which might obstruct the circulation of light and air, or be inconvenient or incommodious to passengers along carriage or footways in certain parts of the metropolis. In 1828, the Local Act for consolidating the Metropolis Turnpike Trusts contained provisions to prevent buildings being erected within fifty feet of the New-road, and within forty feet of the City-road, upon any new foundation. But this law has been defeated by the construction put upon these latter words by the magistrates, whereby fence walls have been construed as buildings, and persons have been allowed to encroach so far as such old foundations could be found. By the Metropolitan Building Act of 1844, further regulations were made to restrain projections from buildings; but, after a short administration of its provisions, it was found that shops built on fore-courts, areas, or gardens, and standing on their own foundations, were not such erections as could be brought within the term, projections from external walls, as used in the Act. For several years, therefore, whilst this law was under consideration for amendment, the builders, architects, and surveyors in the metropolis were unrestrained in their endeavours to encroach upon or break the lines of building in the metropolitan streets and roads.

The legislation of 1855, both in the New Building Act, and also the Metropolis Local Management Act, placed the jurisdiction relative to lines of frontage of buildings in streets in the Metropolitan Board of Works; and now "no building can, without the consent in writing of this Board, be erected beyond the regular line of buildings in the street in which the same is situated, in case the distance of such line of buildings from the highway does not exceed thirty feet, or within thirty feet of the highway, where the distance exceeds thirty feet, notwithstanding there being gardens or vacant spaces between the line of buildings and the highway." This effort of the Legislature is not, however, complete. The means of enforcing this provision is given to the local authorities; and the district surveyors under the Building Act, who are placed under the Metropolitan Board of Works as to matters of building, are not enabled to act under the Local Management Act, and can but imperfectly assist either the central or local authorities in the matter, while the term "regular line of buildings in the street" is open to all sorts of interpretations, as any deviation from the regular line in the whole length of a street is contended for as destroying the existence of "a regular line" altogether; and in many instances the provisions of the Act are thereby rendered nugatory.

Notwithstanding such difficulties, the Board, through their superintending architect, and the surveyor appointed to assist him, cause a personal inspection of every locality to be made before considering any application to extend a building beyond the regular line; and they have endeavoured to meet the justice of every case brought before them, and have granted or refused consent according to the circumstances of each application, restraining where encroachment was sought, but generally permitting where the line was already broken, or might be improved by the proposed erections; and sometimes obtaining for the public a concession of space to widen streets, or round off obstructive corners, greatly to the improvement of the thoroughfares in such instances.

Of such applications there have been no less than 342; and in all cases eight days' notice of these applications is sent to the vestry or district board, inviting the suggestions and opinions of the local authorities, before arriving at any decision.

26. In July 1856, the Act amending the Local Management Act removed doubts that had been entertained regarding the powers of the Board to incur expenses in providing parks, pleasure-grounds, places of recreation, and open spaces for the improvement of the metropolis, or for the public benefit of the inhabitants thereof. The Board were thus enabled to proceed to consider the best means of securing parks, or open spaces, in such neighbourhoods as stood most in need of them, or where building progress would render their future attainment very difficult. Several memorials were addressed to the Board upon that subject, and their Committee of Works and Improvements instituted careful inquiries, with the view of ascertaining what districts of the metropolis were most urgently in need of parks, or open spaces, for the purposes of public health or recreation, and what land could be found available for that object. They also received deputations, consisting of members of the vestries, and of inhabitants of Islington and Stoke Newington on the subject of the Finsbury Park; from Bermondsey, respecting the site suggested for a park in that locality; and from Hampstead, with reference to the preservation of the heath, and a portion of the adjacent land, for public use and enjoyment. They received detailed explanations from members of those deputations on the various points referred to them for investigation, conferred thereon, and visited the sites recommended. They afterwards reported to the Board that it was deemed desirable for the better sanitary condition of the metropolis, and for facilitating the means of healthy recreation for the public, that parks should be established in certain parts of the metropolis, hitherto neglected in that respect.

Eligible sites were proposed at Rotherhithe and Bermondsey. The cost of forming a park of adequate dimensions for this locality would not be less than 100,000 *l.*

27. The park reported as next in point of urgency was that proposed for Finsbury; and an open space of about 250 acres, lying west of the Green-lanes, or Southgate-road, and in the parishes of Hornsey and Islington, was considered eligible for the purpose. The cost would probably not exceed 230,000 *l.*, and it was represented that Her Majesty's Government would contribute 50,000 *l.** A bill for powers to form this park is now before Parliament, and it is proposed that the matter should be adopted and prosecuted by this Board, who have caused a new plan, from actual survey, to be made by their own officers, and an estimate has also been prepared.

28. The purchase of Hampstead Heath, and of such adjoining land as it might be desirable to connect therewith, was recommended to the Board, as the

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* This proposed grant has since been repudiated by the House of Commons, and the Board have determined upon taking the whole cost upon themselves.

Heath presents many advantages for promoting the health and recreation of the inhabitants of the metropolis; and the purchase thereof, if delayed, will involve a very much larger expenditure than would be required at the present time. The expense was estimated at between 150,000 *l.* and 200,000 *l.*

I am, &c.,
Frederick Marrable,
Superintending Architect.

To the Metropolitan Board of Works.

APPENDIX.

29. Statement of Matters of Business transacted in the Department of the Superintending Architect, from January 1856 to June 1857.

Papers Received.

Applications to the Board for the consent and approval of the Board, under various provisions of the Building Act and Metropolis Local Management Act	644
Drawings, and relative correspondence thereon	629
Notices of Works under the professional superintendence of district surveyors, for appointment of other surveyors; and notices as to deputies	45
Returns, monthly, by surveyors of districts, under the Building Act	896
[Each Return consists of three parts: 1. Works commenced; 2. Works completed; 3. Fees received thereon.]	
Occasional Returns, supplemental and explanatory	168
Miscellaneous matters and inquiries	213
	2,595

Papers sent out, and Official Reports.

Correspondence with applicants, and incidental notices, inviting opinions of parochial authorities thereon,* and intimations of the decisions of the Board to applicants, to vestries, and district boards, and to district surveyors	3,984
Correspondence with district surveyors relative to returns	69
Various circulars to district surveyors and others. (616 copies issued)	11
Reports to the Board upon applications and other matters	652
	4,716

Surveys and plans laid down (7), surveys in progress (3), and estimates of metropolitan improvements (8)		18
Personal surveys of projections and lines of buildings, and of sheds and wooden buildings or sites		364
Attending meetings of the Board		99
Attending meetings of committees:		
On bye-laws and conferences	7	
On duties of Board under Building Act	14	
On works and improvements	28	
On site of offices	15	
Of the whole Board	11	
On appeals	3	
		78

[Diagram plans have been made at various times for the use of the Board, of proposed parks at Rotherhithe, Bermondsey, Finsbury, and of Hampstead Heath; and a detailed plan of London is now in progress, according to an order of the Board, showing all the public buildings, docks, burial grounds, squares, and all the streets and roads, coloured; with all suggestions made to the Board of Works, or this Board, relative to the facilitation of metropolitan communications in the metropolis.]

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* [*N.B.*—Three letters (*) in each case receive only one number in the Register.]

Classification of Applications.

	Granted.	Refused.
Cases under section 143 of the Local Management Act, as to shops on fore-courts, and other buildings, in regard to line of buildings in streets - - - - - - - - - - - - - -	178	99
Cases under section 26 of the Building Act, and partly under section 143, as to projections of porches, porticoes, balconies, verandahs, &c.	52	13
Cases under section 26, as to materials of eaves - - - - -	22	—
Cases of a special nature, under section 56 of Building Act:		
Furnace chimney-shafts - - - - - - - - - -	87	10
Shed buildings and wooden buildings, &c. - - - - -	53	18
Iron buildings - - - - - - - - - - - -	18	6
Cases as to ordering fees for special services in regard to dangerous structures, and other works - - - - - - - - -	14	2
Cases under bye-law, as to widths and formation of streets - -	9	2
	433	150
	583	
Miscellaneous cases - - - - - - - - - - - -	61	
(Not requiring approval, or dropped, and pending matters.)	644	

BYE-LAWS under the Act for the better Local Management of the Metropolis, and General Rules under the Metropolitan Building Act.

FOR Regulating the Business and Proceedings at Meetings, and for carrying into Effect the Purposes of the Act for the better Local Management of the Metropolis.

1.—*Ordinary Meetings.*

Ordinary meetings of the Board shall be held once in each week, at 12 o'clock at noon, unless it be otherwise specially ordered by the Board.

2.—*Special Meetings.*

A special meeting of the Board may be convened by the chairman of the Board, or by the clerk thereof upon the requisition in writing of the chairman or any five members of the Board, which requisition shall state the time and place of such meeting, and the object thereof.

3.—*Notice of Meetings.*

Notice of every ordinary meeting of the Board shall be addressed by the clerk to each member at his usual address, and posted or sent two clear days before the day appointed for such meeting. Such notice shall be signed by the chairman or clerk, and shall state the time and place of such meeting, and the business to be transacted, so far as the same is known, in its appointed order.

All recommendations contained in the reports of committees shall be printed in the Agenda, and circulated amongst the members of the Board.

4.—*Signing Attendance Book.*

Every member of the Board attending a meeting shall sign his name in the "Attendance Book."

5.—*Election of Chairman of Meeting.*

18 & 19 Vict. c. 120, s. 58. At every meeting of the Board, in the absence of the chairman of the Metropolitan Board of Works, the members present shall, before proceeding to other business, elect a chairman for the occasion.

6.—*Minutes.*

18 & 19 Vict. c. 120, s. 60. At every meeting the minutes of the last meeting shall be read as the first business after the chairman has taken his seat, and, if accurate, shall be signed by two members who shall have been present at the meeting to which they relate. No motion or discussion shall be allowed upon the minutes except as to their accuracy; and any objection on that ground must be made by motion, and decided by show of hands in the ordinary mode.

7. *Order*

7.—*Order of Business.*

At all meetings of the Board, after the minutes have been read and signed the business shall, unless otherwise ordered, be proceeded with in the following order:—

1. Deputations in attendance.
2. To receive from members of the Board communications in writing from vestries and district Boards.
3. Reports and communications from committees.
4. Reports and communications from officers of the Board.
5. Business appointed for the particular meeting by resolution of a previous Board.
6. Reading correspondence with Board, and business brought forward by the clerk, under the special direction of the chairman.
7. Motions of which notice has been given, in the order in which they are inserted in the notice paper of the meeting.

8.—*Admission of Deputations and Proceedings thereon.*

Every deputation shall be required to be provided with a memorial in writing to be laid before the Board, stating the nature and object of the application; and no deputation shall be received unless the deputation be introduced, and the memorial presented, by a member of the Board. One member only of a deputation shall be at liberty to address the Board, except in reply to questions from members.

Notice shall be given at the Office of the Board of all petitions or memorials intended to be presented to the Board, at least three clear days before their presentment; and notice of the subject of such petition or memorial shall be printed in the notice for the Board.

9.—*Voting.*

Every question arising at any meeting shall be determined by the votes of the majority of the members present thereat.

10.—*Motions without Notice.*

The following motions may be moved without notice:—

For reading or answering any correspondence or other documents;
For the precedence of any particular business;
For appointing any business for the consideration of a future meeting;
And motions upon any matters of emergency.

Notice of all other motions must be given as hereinafter provided.

11.—*Motions with Notice.*

Every notice of motion shall be given in writing, signed by the member giving it, and shall be left with the clerk three clear days at the least before the day of meeting, at which it is intended to be discussed.

All such notices shall be dated and numbered as received, and entered in a book to be kept for that purpose by the clerk, and to be open to the inspection of members.

Notices of motion, unless withdrawn, shall be entered by the clerk upon the business paper in the order in which they are received.

12.—*Motions to be proposed by Members giving Notice.*

Any motion of which notice has been given, shall be proposed by the member who has given it; but, in case of his absence, any other member shall have the right to move it.

13.—*Dropped Motions.*

A motion, notice of which is duly inserted in the business paper, if it be not moved at the Board when it comes on in due course, shall, unless postponed by leave of the Board, be considered as dropped, and shall not be moved without fresh notice.

14.—*Motions, &c., in Writing.*

Every motion or amendment shall be in writing; and every motion or amendment must be seconded before it can be discussed or put to the vote.

15.—*Amendments.*

Whenever an amendment is made upon any motion, no second amendment shall be taken into consideration until the first amendment is disposed of. If that amendment be carried, it shall then be put as an original motion, upon which a further amendment may be moved. If the first amendment be negatived, then a further amendment may be moved to the original question; but only one amendment shall be submitted to the Board for discussion at one time.

16.—*Amendments.*

All amendments must be relevant to the motion, and must be stated to the chairman before the mover speaks thereon. No member shall be at liberty to move more than one amendment upon any motion.

17.—*Members to speak once only.*

A member shall not speak more more than once on the same motion, amendment, or point of order, except in reply upon the original motion.

18.—*Members not eligible for Appointments.*

No member of the Board shall be eligible to be appointed an officer of the Board, unless he shall have ceased to be a member of the Board 12 months.

19.—*Mode of drawing Cheques.*

All orders for payment of moneys shall be made at a Board meeting, and every draft for payment shall be signed at a Board meeting by two members present at such meeting other than the chairman; the draft so signed shall be countersigned by the clerk and accountant, and lastly by the chairman, on his delivering the same to the party entitled to receive the same, or (in the case of cheques drawn for a gross amount to be afterwards distributed in smaller sums among sluice-keepers, collectors, or other officers) to the accountant, on his endorsing such cheque.

20.—*Half an Hour allowed to form a Quorum.*

If at the expiration of 30 minutes after the hour at which any meeting of the Board is appointed to be held, nine members of the Board shall not be present, such meeting shall not take place.

21. *Finance Committee to examine Securities annually.*

It shall be the duty of the finance committee to examine, in the month of January in each year, the several bonds and other securities given to the Board, and to cause inquiries to be made into the responsibility of the parties, and the validity of such securities, and to report thereon to the Board.

22.—*Chairman to preside at all Committees.*

The chairman of the Board shall be the chairman of all committees at which he is present. In his absence some other member of the committee shall be chosen to preside thereat.

FOR REGULATING THE PLANS, WIDTH, SURFACE-INCLINATION, AND THE MATERIALS OF THE PAVEMENT AND ROADWAY OF NEW STREETS AND ROADS.

23.—*Formation of New Streets.*

In pursuance of the powers vested in the Metropolitan Board of Works by the Act of Parliament passed in the 19th year of the reign of Her present Majesty, intituled, " An Act for the better Local Management of the Metropolis," it is hereby ordered by the said Board as follows, that is to say:

Four weeks, at the least, before any new street shall be laid out, written notice shall be given to the Metropolitan Board of Works, at their office, No. 1, Greek-street, Soho, in the county of Middlesex, by the person or persons intending to lay out such new street, stating the proposed level and width thereof, and accompanied by a plan of the ground, showing the local situation of the same.

Forty feet, at the least, shall be the width of every new street intended for carriage traffic; 20 feet, at the least, shall be the width of every new street intended only for foot traffic: provided that the said width respectively shall be construed to mean the width of the carriage and footway only, exclusive of any gardens, fore-courts, open areas, or other spaces in front of the houses or buildings erected or intended to be erected in any street.

Every new street shall, unless the Metropolitan Board of Works otherwise consent in writing, have at the least two entrances of the full width of such street, and shall be open from the ground upward.

The measurement of the width of every new street shall be taken at a right angle to the course thereof, half on either side, from the centre or crown of the roadway to the external wall or front of the intended houses or buildings on each side thereof; but, where fore-courts or other spaces are intended to be left in front of the houses or buildings, then the width of the street, as already defined, shall be measured from the centre line up to the fence, railing, or boundary, dividing or intended to divide, such forecourts, gardens, or spaces, from the public way.

The carriage-way of every new street must curve, or fall from the centre or crown thereof, at the rate of three-eighths of an inch at the least for every foot of breadth.

In every new street the kerb to each footpath must not be less than four nor more than eight inches above the channel of the roadway, except in the case of crossings, paved or formed for the use of foot-passengers; and the slope of every footpath towards the kerb must be half an inch to every foot of width, if the footpath be unpaved, or not less than a quarter of an inch to every foot of width if the footpath be paved.

In this bye-law the word "street" shall be interpreted to apply to and include any highway (except the carriage-way of any turnpike road), and any road, public bridge (not being a county bridge), lane, footway, square, court, alley, or passage, whether a thoroughfare or not, and a part of any such highway, road, bridge, lane, footway, square, court, alley, or passage.

In case of any breach of the regulations contained in this bye-law, the offender shall be liable, for each offence, to a penalty of 40 *s.*, and, in case of a continuing offence, to a further penalty of 20 *s.* for each day after notice thereof from the Metropolitan Board of Works.

Construction of New Sewers, and Communications with Main and other Sewers.

24.—*Construction of New Sewers.*

No new sewer shall be made without the previous approval of the Metropolitan Board of Works; and all vestries and district boards proposing to construct new sewers shall, before commencing any works for that purpose, submit to the said Board plans of the streets or places in which it is proposed to construct new sewers, drawn upon tracing cloth, to a scale of five feet to the mile, with the position of the proposed sewers shown thereon, and longitudinal sections of such sewers drawn to the same horizontal scale, and to a vertical scale of 11 feet to an inch, with the heights, from Ordnance datum, to the invert of the proposed sewers, figured, and the rate of inclination specified therein. Also cross sections of the proposed sewers, drawn to a scale of half an inch to a foot, with a statement of the thickness, and a description of the materials intended to be used in their construction.

When it shall be intended to abandon wholly, or in part, or to extend, contract, or alter any design for a sewer previously submitted to and approved by the Metropolitan Board of Works, notice in writing of such intention shall be given to the said Board, accompanied by plans and sections, as hereinbefore described, showing the extension contraction, or alteration which may be intended; and no such abandonment, extension, contraction, or alteration shall be permitted without the previous approval, in writing, of the Metropolitan Board of Works.

Three clear days' notice in writing shall be given to the Metropolitan Board of Works by a vestry or district board, previously to the connexion of any sewer or drain with a main sewer; and the necessary junction for that purpose shall be made by such vestry or district board, to the satisfaction of the Metropolitan Board of Works.

25.—*For regulating Communications with Main and other Sewers.*

That where it is intended to lay house-drains into main sewers, the following be the form of notice to be given by vestries and district boards:

To the Metropolitan Board of Works.

Application having been made to the vestry or district board of
by   of   for leave to lay
down a   pipe drain   inches in diameter, to and from
the house situate   into the main sewer,
situate   the said vestry or district
board of   therefore hereby give notice, in accordance with the
regulations of the said board, that the said communication with the said sewer will be
made by them at the expiration of three days from the service hereof.
Dated this   day of   185 .

The following formalities shall be observed by persons wishing to branch sewers into main or other sewers, and by persons proposing to branch drains into main sewers:

All persons wishing to make or branch a sewer, either into a sewer vested in the Metropolitan Board of Works, or into a sewer vested in any vestry or district board, shall, in the first instance, lay the plans and sections relating thereto before, and apply for the sanction of, the vestry or district board in which such last-mentioned sewer shall be situate, and no such sewer shall be begun to be made until the sanction of such vestry or district board shall have been given.

Before any vestry or district board shall sanction the construction of any such sewer, they shall submit the plans and sections thereof, when the same shall have been approved by them, to the Metropolitan Board of Works for their sanction, in the same manner as if such sewer were proposed to be constructed by such vestry or district board.

All persons wishing to make or branch any drain into a sewer vested in the Metropolitan Board of Works, shall, seven days before commencing any works for that purpose, submit a proper plan and description in reference thereto before, and apply, in writing, for the sanction of the vestry or district board in which such sewer shall be situate, and no such work shall be commenced until the sanction of the said vestry or district board shall have been given.

General Rules relative to Applications with reference to Buildings to which the Rules of the Metropotitan Building Act are inapplicable.

26.—*Applications under Metropolitan Building Act, Section 57, and Metropolis Local Management Act, Section 143.*

That the following rules and regulations with respect to the applications to the Board, under the Metropolitan Building Act (and the 143d section of the Metropolis Local Management Act) be adopted, and that they be printed and issued to the public, (sect. 57, Metropolitan Building Act 1855):

All applications must be made, in writing, on foolscap paper, setting forth the nature of the building, work, or other matter, the situation and district in which the same is to be built, and describing all necessary particulars as to the proposed mode of construction, stating under which section of the Act the sanction is sought; to be accompanied by plans and sections drawn to a scale of one-eighth of an inch to a foot (when practicable), with dimensions and thicknesses figured thereon, together with a block plan to a smaller scale, showing the situation of the building with reference to adjoining buildings, and to the ground of any adjoining owner.

In the event of the sanction of the Board being granted, duplicate drawings or tracings must be supplied by the applicant for enrolment in the office of the Board, and for transmission to the district surveyor for his guidance.

Applications that are not received at the office of the Metropolitan Board of Works (No. 1, Greek-street, Soho), at least three[*] clear days before the next meeting of the Board, cannot be entertained at that meeting.

27.—*Notice of Application to be given to Vestry or District Board.*

That on the receipt of any application to extend buildings beyond the general line of frontage, such application be communicated to the vestry or district board of the parish or district in which the locality is situate, and that they be apprised that this Board will be prepared to receive any suggestions they may deem it desirable to make upon the subject, and will take such suggestions into consideration before finally deciding upon the application.

28.—*Erection of Furnace Chimney Shafts.*

All builders or other persons who may be desirous of erecting any chimney-shaft of a steam-engine, brewery, distillery, or manufactory, the same being buildings to which the rules of the Metropolitan Building Act, 1855, are inapplicable, shall, before commencing any such building, make an application to this Board, requesting their approval thereof, setting out a plan of the proposed building, and such other necessary particulars as may be required by the Board. (Sect. 56, Metropolitan Building Act, 1855.)

29.—*Fees for Special Services by District Surveyors in Supervision of Furnaces, &c.*

That the following fees be demanded and received by every district surveyor under the Metropolitan Building Act, 1855, who shall perform any of the services hereinafter enumerated, the same being special services required to be performed under the first part of the Metropolitan Building Act, 1855, for which no fee is specified in the first part of the second Schedule to the Act, viz.:

For the supervision of furnaces and chimney-shafts:	£.	s.	d.
For every furnace and chimney-shaft belonging thereto,—			
Not exceeding 75 feet in height	1	10	–
Not exceeding 100 feet	2	–	–
For every 10 feet in addition, up to 150 feet	–	2	6
For every 10 feet in addition, above 150 feet	–	5	–

Proceedings in case of Disagreement as to mode of Constructing Public Buildings.

30.—*Construction of Public Buildings.*

In any case in which a disagreement shall arise between the district surveyor and the builder, or building surveyor, under the provisions contained in the 30th section of the Metropolitan Building Act, as to the mode of constructing any public building upon which the decision of this Board becomes necessary, the question shall be brought before the Board by a memorial setting forth the facts of the case, accompanied by plans and explanations, upon receipt of which the superintending architect shall communicate with the other party, and require him to furnish similar information in support of his case; and, when the same shall have been received, the whole matter shall be laid before the Board, before whom the parties shall be required to appear, and, if deemed necessary, with witnesses.

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[*] In consequence of the resolution of the Board of the 4th July 1856, directing applications of this nature to be communicated to the vestry, &c., such applications must now be received at the office, eight instead of three clear days before the day of meeting.

ACCOUNT in ABSTRACT, showing the RECEIPT and EXPENDITURE, under the several distinct Heads, from the 1st January 1856 to the 25th March 1857, with the Statement of the Allowance of the Auditor; also, Summary Statement of all CONTRACTS entered into during such Period, and of the Monies owing to, and Debts and Liabilities owing by, the Board, on the 25th March 1857.

STATEMENT of the ALLOWANCE of the AUDITOR.

I, WILLIAM ANDOE, the Auditor appointed by the Right Honourable Sir George Grey, Bart., one of Her Majesty's Principal Secretaries of State, to audit the Accounts of the Metropolitan Board of Works for the Year 1856, having carefully examined the Accounts of the said Board, for the period from 1st January 1856, when the Metropolis Local Management Act, 18 & 19 Vict. c. 120, came into operation, to the 25th March 1857, as defined by the Act, and the Books and Documents in their custody relating thereto, do hereby certify and declare that I have this day audited the said Accounts at their Office, No. 1, Greek-street, Soho, in the county of Middlesex, in the presence of John Thwaites, Esq., Chairman of the Board, and that the said Accounts are true and correct; and I do allow the same, and sign the Statement and Account required by the Act in token of such my allowance thereof.

Given under my hand this 30th day of May, in the year of our Lord 1857.

(signed) *William Andoe*, Auditor.

ACCOUNT IN ABSTRACT, SHOWING THE RCH 1857. - - - -

ACCOUNT IN A

PARISHES, DISTRICTS, AND PARTS.	CASH BALANCES, 1s				ETS AND LIABILITIES ON 25TH MARCH 1857.	
					Debts owing by the Board.	
	In Debt.				Mortgage Loans and other Standing Liabilities.	Current Liabilities.
	£. s. d.	£. s. d.	£. s. d.	£.	£. s. d.	£. s. d.
CITY OF LONDON	- - -	- - -	1,479 13 10	-	13,438 12 2	215 3 4
ST. MARYLEBONE:						
Whole Parish	- - -	1,228 15 1	- - -	-	11,159 11 6	178 13 6
Ranelagh	- - -	- - -	- - -	-	1,678 15 4	273 3 11
Ditto - Bayswater Sewer	- - -	- - -	- - -	-	- - -	- - -
Western Division, Westminster Sewers	- - -	- - -	- - -	-	7,043 17 9	300 13 9
Regent-street, &c.	- - -	- - -	- - -	-	157 13 9	47 2 8
Eastern Division, Westminster Sewers	- - -	- - -	- - -	-	426 2 1	48 3 7
Holborn	- - -	- - -	- - -	-	3 15 6	- 3 9
		1,228 15 1				
ST. PANCRAS:						
Whole Parish	- - -	868 10 4	- - -	-	7,887 17 11	126 5 10
Regent-street, &c.	- - -	- - -	- - -	-	124 18 9	37 6 11
Eastern Division, Westminster Sewers	- - -	- - -	- - -	-	197 6 -	22 6 2
Holborn	- - -	- - -	- - -	-	3,812 16 1	191 10 7
		868 10 4	53 5 5			
LAMBETH	- - -	- - -	- - -	-	44,511 16 6	724 15 2
ST. GEORGE, HANOVER-SQUARE:						
Whole Parish	- - -	1,099 3 4	- - -	-	9,982 13 3	159 16 8
Ranelagh	- - -	- - -	- - -	-	2,141 11 7	348 10 2
Western Division, Westminster Sewers	- - -	- - -	- - -	-	7,834 13 11	334 8 11
Regent-street, &c.	- - -	- - -	- - -	-	9 19 5	2 19 7
		1,099 3 4				
ISLINGTON, ST. MARY	- - -	- - -	257 10 8	-	5,901 18 9	235 4 1
SHOREDITCH, ST. LEONARD	- - -	- - -	156 18 8	-	3,397 6 -	135 7 10
PADDINGTON:						
Whole Parish	- - -	528 13 11	- - -	-	4,801 12 8	76 17 7
Counter's Creek	- - -	- - -	- - -	-	1,771 2 6	414 - 10
Ranelagh	- - -	- - -	- - -	-	4,718 8 7	767 17 2
Ditto, Bayswater Sewer	- - -	- - -	- - -	-	- - -	- - -
		528 13 11				
ST. MATTHEW, BETHNAL-GREEN	- - -	- - -	- - -	-	3,834 5 2	135 19 8
ST. MARY, NEWINGTON, SURREY	- - -	- - -	- - -	-	17,250 15 1	254 2 10
CAMBERWELL:						
Whole Parish	- - -	258 4 -	- - -	-	2,344 19 8	37 10 11
Surrey and Kent	- - -	- - -	- - -	-	16,622 7 11	241 18 1
Ravensbourne	- - -	- - -	- - -	-	321 7 3	1 17 3
		258 4 -				
ST. JAMES, WESTMINSTER:						
Whole Parish	- - -	505 16 5	- - -	-	4,593 17 10	73 11 1
Western Division, Westminster Sewers	- - -	- - -	- - -	-	2,441 7 7	104 4 4
Regent-street, &c.	- - -	- - -	- - -	-	164 7 11	49 2 9
Eastern Division, Westminster Sewers	- - -	- - -	- - -	-	333 13 5	37 14 6
		505 16 5				
ST. JAMES AND ST. JOHN, CLERKENWELL	- - -	- - -	145 17 6	-	2,905 19 4	115 16 3
CHELSEA:						
Whole Parish	- - -	266 8 7	- - -	-	2,419 14 3	38 14 10
Counter's Creek	- - -	- - -	- - -	-	4,126 1 4	964 11 2
Ranelagh	- - -	- - -	- - -	-	2,082 15 11	338 18 11
		266 8 7				
Carried forward (to p. 54) £.	- - -	- - -	2,093 6 1	-	190,444 2 8	7,034 14 7

- - - - - ACCOU 1st JANUARY 1856 TO THE 25th MARCH 1857.

		MAIN INTERCEPTING DRAINAGE.			GENERAL PURPOSES.	TOTAL RECEIPTS.
District Rates.	Improvement Rates, &c.	s, &c. rest.	Investments. Sale of and Interest on Exchequer Bills.	Total.	Contributions, &c. Incidental Receipts.	
£. s. d.	£. s. d.	s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
- - - -	- - -	2 2	491 12 4	903 14 6	1 14 7	905 9 1
- - - -	- - -	4 5	408 4 11	750 9 4	1 8 8	751 18 -
810 2 11	- - -	- -	- - - -	- - - -	- - - -	810 5 9
4 1 10	- - -	- -	- - - -	- - - -	- - - -	4 1 10
430 11 5	- - -	- -	- - - -	- - - -	- - - -	431 3 7
654 19 1	- - -	- -	- - - -	- - - -	- - - -	655 - 7
40 3 6	- - -	- -	- - - -	- - - -	- - - -	40 6 3
2 12 6	- - -	- -	- - - -	- - - -	- - - -	2 12 6
- - - -	- - -	17 10	288 11 2	530 9 -	1 - 3	531 9 3
625 4 11	- - -	- -	- - - -	- - - -	- - - -	625 6 4
22 8 3	- - -	- -	- - - -	- - - -	- - - -	22 9 10
3,203 11 6	- - -	- -	- - - -	- - - -	- - - -	3,205 1 10
3,324 8 4	- - -	17 7	200 5 5	368 3 -	- 14 1	3,753 8 10
- - - -	- - -	2 7	365 3 10	671 6 5	1 5 8	672 12 1
931 15 9	- - -	- -	- - - -	- - - -	- - - -	931 19 -
431 15 9	- - -	- -	- - - -	- - - -	- - - -	432 7 11
37 6 9	- - -	- -	- - - -	- - - -	- - - -	37 6 10
5,251 3 5	- - -	12 10	178 10 4	328 3 2	- 12 7	5,587 - 4
2,859 10 9	- - -	2 9	102 15 2	188 17 11	- 7 3	3,050 10 8
- - - -	- - -	4 11	175 13 1	322 18 -	- 12 4	323 10 4
28 15 1	- - -	- -	- - - -	- - - -	- - - -	28 15 5
2,763 16 -	- - -	- -	- - - -	- - -	- - - -	2,764 5 9
22 3 8	- - -	- -	- - - -	- - - -	- - - -	22 3 8
406 13 10	- - -	15 2	42 13 1	78 8 3	- 3 -	697 7 -
1.176 8 10	- - -	1 3	77 12 4	142 13 7	- 5 5	1,342 9 1
- - - -	- - -	18 3	85 15 9	157 14 -	- 6 -	158 - -
1,395 15 2	- - -	- -	- - - -	- - - -	- - - -	1,421 9 2
- 1 7	- - -	- -	- - - -	- - - -	- - - -	1 9 7
- - - -	- - -	17 6	168 1 2	308 18 8	- 11 10	309 10 6
166 6 11	- - -	- -	- - - -	- - - -	- - - -	166 11 7
761 3 8	- - -	- -	- - - -	- - - -	- - - -	761 5 5
35 1 5	- - -	- -	- - - -	- - - -	- - - -	35 3 10
2,227 10 1	- - -	13 7	87 17 11	161 11 6	- 6 2	2,393 14 3
- - - -	- - -	4 1	88 10 5	162 14 6	- 6 3	163 - 9
57 18 7	- - -	- -	- - - -	- - - -	- - - -	57 19 3
1,054 19 5	- - -	- -	- - - -	- - - -	- - - -	1,055 3 2
28,626 10 11	- - -	14 11	2,761 6 11	5,076 1 10	9 14 1	34,152 9 3

Continued on page 52.

WORKS.

H 1857. -

DRAINAGE. -

ESTABLISHMENT.							LOANS, &c.			
Collectors' Poundage, &c.	Rent, Taxes, &c.	Office Repairs, Furniture, &c.	Stationery, Printing, &c.	Instruments, Maps, Plans, &c.	Miscellaneous Expenses.	Total.	Loans paid off.	Interest on Loans.	Annuities.	Total.
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
31 5 1	3 13 3	1 19 7	6 18 -	2 16 8	4 2 3	56 6 7	- - -	58 14 4	- - -	58 14 4
- 6 2	- -	- -	- -	- -	- -	- 6 2	- - -	- - -	- - -	- - -
16 10 10	15 12 -	8 8 4	29 7 4	12 1 4	17 10 3	118 6 9	- - -	312 15 4	- - -	312 15 4
11 6 6	1 18 1	1 - 7	3 11 9	1 9 6	2 2 9	24 - 9	- - -	- - -	- - -	- - -
3 - 7	3 11 6	1 18 7	6 14 7	2 15 3	4 - 3	26 11 4	- - -	- - -	- - -	- - -
- 1 9	- - 3	- - 2	- - 6	- - 3	- - 4	- 3 6	- - -	- 2 2	- - -	- 2 2
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
8 19 6	1 10 2	- 16 3	2 16 10	1 3 4	1 13 11	19 - 11	- - -	- - -	- - -	- - -
1 8 1	1 13 1	- 17 10	3 2 4	1 5 7	1 17 2	12 6 1	- - -	- - -	- - -	- - -
85 18 3	14 7 3	7 15 -	27 - 10	11 2 2	16 2 7	179 15 8	- - -	103 14 9	- - -	103 14 9
185 4 5	17 10 1	6 11 1	22 17 3	9 7 10	13 12 8	277 13 1	- - -	1,740 15 1	145 6 6	1,886 1 7
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
39 17 6	4 13 6	2 10 5	8 16 -	3 12 4	5 5 -	71 17 5	- - -	74 18 2	- - -	74 18 2
18 8 -	17 7 -	9 7 3	32 13 3	13 8 5	19 9 7	131 12 5	- - -	347 17 9	- - -	347 17 9
- 14 5	- 2 5	- 1 4	- 4 7	- 1 10	- 2 9	1 10 7	- - -	- - -	- - -	- - -
196 1 10	10 16 11	5 17 1	20 8 5	8 7 9	12 3 6	269 12 9	- - -	- - -	- - -	- - -
112 17 4	6 4 9	3 7 4	11 15 -	4 16 7	7 - 1	155 3 6	- - -	- - -	- - -	- - -
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
1 15 3	- 7 1	- 3 10	- 13 3	- 5 5	- 7 11	4 3 5	- - -	77 19 4	- - -	77 19 4
87 17 3	10 6 -	5 11 2	19 7 9	7 19 4	11 11 3	158 7 3	- - -	165 - 8	- - -	165 - 8
1 13 11	- -	- -	- -	- -	- -	1 13 11	- - -	- - -	- - -	- - -
16 4 8	2 11 9	1 7 11	4 17 5	2 - -	2 18 1	34 1 8	- - -	106 7 -	- - -	106 7 -
71 15 8	6 15 6	2 10 9	8 17 3	3 12 10	5 5 8	107 12 1	- - -	674 12 9	56 6 7	730 19 4
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
78 17 5	7 8 11	2 15 10	9 14 8	4 - -	5 16 1	118 4 7	- - -	741 4 4	61 17 3	803 1 7
- - 1	- - 7	- - 4	- 1 2	- - 6	- - 8	- 4 9	58 3 2	15 18 6	- - -	74 1 8
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
5 14 9	5 8 2	2 18 4	10 3 7	4 3 8	6 1 5	41 - 7	- - -	108 8 -	- - -	108 8 -
11 16 1	1 19 9	1 1 5	3 14 9	1 10 9	2 4 7	25 1 2	- - -	- - -	- - -	- - -
2 7 5	2 16 -	1 10 2	5 5 5	2 3 4	3 2 10	20 16 -	- - -	- - -	- - -	- - -
96 10 10	5 6 9	2 17 7	10 - 10	4 2 6	5 19 10	132 14 5	- - -	- - -	- - -	- - -
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
4 2 5	- 16 5	- 8 10	1 10 11	- 12 9	- 18 5	9 14 5	- - -	181 12 7	- - -	181 12 7
38 15 8	4 10 11	2 9 1	8 11 2	3 10 4	5 2 1	69 18 2	- - -	72 16 10	- - -	72 16 10
129 11 8	147 8 1	74 6 1	259 4 10	106 10 3	154 11 11	2,067 19 11	58 3 2	4,782 17 7	263 10 4	5,104 11 1

- PAYMENT

SEWERAGE AND DRAINAGE.						METROPOLIS IMPROVEMENTS.	MAIN INTERCEPTING DRAINAGE.			
CONTINGENCIES.					TOTAL.		LOANS, &c.			
Law and Parliamentary Expenses.	Retiring Allowances.	Temporary Allowances, &c.	Sums Refunded.	Total.			Loans Paid off.	Interest on Loans.	Total.	rs.
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	d.
- - -	- - -	- - -	- - -	- - -	- - -	- - -	746 11 9	618 7 3	1,364 19 –	2, 1
- - -	- - -	- - -	- - -	- - -	- - -	- - -	619 19 6	513 10 –	1,133 9 6	1, 11
- - -	15 5 11	– 7 –	– 3 4	15 16 3	1,993 10 8	- - -	- - -	- - -	- - -	- 8
- - -	- - -	- - -	- - -	- - -	– 6 2	- - -	- - -	- - -	- - -	- 2
1 18 2	72 4 5	1 9 11	- - -	75 12 6	6,113 10 7	- - -	- - -	- - -	- - -	- 7
– – 1	– 3 11	– 3 8	69 7 3	69 14 11	535 6 1	- - -	- - -	- - -	- - -	- 1
– 18 –	18 5 4	– 6 10	- - -	19 10 2	1,271 10 9	- - -	- - -	- - -	- - -	- 9
- - -	– 2 2	- - -	- - -	– 2 2	2 11 2	- - -	- - -	- - -	- - -	- 2
- - -	- - -	- - -	- - -	- - -	- - -	- - -	438 4 4	362 19 –	801 3 4	1, 5
- - -	– 3 2	– 2 11	54 19 2	55 5 3	424 2 8	- - -	- - -	- - -	- - -	- 8
– 8 4	8 9 3	– 3 2	- - -	9 – 9	588 15 5	- - -	- - -	- - -	- - -	- 5
– 5 1	101 2 4	1 7 7	- - -	102 15 –	2,575 – 11	- - -	- - -	- - -	- - -	- 11
2 11 1	45 5 3	1 3 3	- - -	48 19 7	7,249 15 8	- - -	304 2 9	251 18 –	556 – 9	7
- - -	- - -	- - -	- - -	- - -	- - -	- - -	554 11 10	459 6 10	1,013 18 8	1, 6
- - -	19 10 2	– 8 11	– 4 4	20 3 5	2,543 5 2	- - -	- - -	- - -	- - -	- 2
2 2 5	80 6 10	1 13 3	- - -	84 2 6	6,799 18 3	- - -	- - -	- - -	- - -	- 3
- - -	– – 3	– – 3	4 7 9	4 8 3	33 17 5	- - -	- - -	- - -	- - -	- 5
- - -	64 5 2	1 – 10	- - -	65 6 –	3,147 18 10	- - -	271 2 –	224 10 9	495 12 9	7
- - -	36 19 4	– 11 11	- - -	37 11 3	1,811 17 3	- - -	156 1 –	129 5 –	285 6 –	4
- - -	- - -	- - -	- - -	- - -	- - -	- - -	266 15 2	220 18 10	487 14 –	3
- - -	1 6 2	– – 8	1 1 6	2 8 4	617 8 2	- - -	- - -	- - -	- - -	- 2
- - -	42 18 10	– 19 9	– 9 6	44 8 1	5,603 7 3	- - -	- - -	- - -	- - -	- 3
- - -	- - -	- - -	- - -	- - -	1 13 11	- - -	- - -	- - -	- - -	- 11
- - -	15 12 5	– 4 11	– 1 9	15 19 1	1,157 16 7	- - -	64 15 7	53 13 1	118 8 8	6
– 19 9	17 10 8	– 9 –	- - -	18 19 5	2,594 3 2	- - -	117 17 5	97 12 6	215 9 11	11
- - -	- - -	- - -	- - -	- - -	- - -	- - -	130 5 6	107 18 1	238 3 7	6
1 1 9	19 5 7	– 9 11	- - -	20 17 3	2,850 1 10	- - -	- - -	- - -	- - -	- 10
– 1 7	– – 1	– – 1	- - -	– 1 9	131 13 5	- - -	- - -	- - -	- - -	- 5
- - -	- - -	- - -	- - -	- - -	- - -	- - -	255 4 4	211 7 7	466 11 11	9
– 13 3	25 1 2	– 10 4	- - -	26 4 9	2,118 19 –	- - -	- - -	- - -	- - -	- –
– – 1	– 4 1	– 3 9	72 6 4	72 14 3	558 1 11	- - -	- - -	- - -	- - -	- 11
– 14 1	14 6 3	– 5 4	- - -	15 5 8	995 14 7	- - -	- - -	- - -	- - -	- 7
- - -	31 13 –	– 10 3	- - -	32 3 3	1,549 17 7	- - -	133 9 8	110 11 1	244 – 9	11
- - -	- - -	- - -	- - -	- - -	- - -	- - -	134 8 7	111 6 9	245 15 4	4
- - -	3 – 5	– 1 7	2 10 –	5 12 –	1,438 5 9	- - -	- - -	- - -	- - -	- 9
- - -	18 19 –	– 8 8	– 4 2	19 11 10	2,473 5 10	- - -	- - -	- - -	- - -	- 10
11 13 8	652 1 2	13 3 9	205 15 1	882 13 8	57,181 16 –	- - -	4,193 9 5	3,473 4 9	7,666 14 2	12 6

ACCOUNT IN

SSETS AND LIABILITIES
ON 25TH MARCH 1857.

PARISHES, DISTRICTS, AND PARTS.	CASH BALANCES, 1					Debts owing by the Board.	
	In Debt.				ing to rd.	Mortgage Loans and other Standing Liabilities.	Current Liabilities.
	£. s. d.	£. s. d.	£. s. d.		d.	£. s. d.	£. s. d.
Brought forward (from p. 50)	- - -	- - -	2,093 6 1	-	4	190,444 2 8	7,034 14 7
KENSINGTON, ST. MARY ABBOTTS:							
Whole Parish	- - -	297 17 11	- - -	-	1	2,705 9 8	43 6 4
Counter's Creek	- - -	- - -	- - -	-	1	20,409 18 1	4,771 5 2
Ranelagh	- - -	- - -	- - -	-	9	887 14 4	144 9 3
		297 17 11					
ST. LUKE, MIDDLESEX	- - -	- - -	109 9 6	-	8	2,205 9 8	87 17 11
ST. GEORGE-THE-MARTYR, SOUTHWARK	- - -	- - -	- - -	-	-	11,318 5 5	166 14 10
BERMONDSEY	- - -	- - -	- - -	-	9	11,953 17 10	176 2 2
ST. GEORGE-IN-THE-EAST:							
Whole Parish	- - -	204 2 1	- - -	-	9	1,853 13 4	29 13 7
Spitalfields, &c.	- - -	- - -	- - -	-	7	3,024 14 2	132 19 8
Lower Wapping	- - -	151 14 8	- - -	-	2	91 1 6	1 16 1
Hermitage-street	- - -	- - -	- - -	-	-	51 17 5	- - 3
		355 16 9					
ST. MARTIN-IN-THE-FIELDS:							
Whole Parish	- - -	307 7 8	- - -	-	9	2,791 12 11	44 13 11
Western Division of Westminster Sewers	- - -	- - -	- - -	-	3	63 - -	2 13 10
Regent-street, &c.	- - -	- - -	- - -	-	-	66 14 5	19 18 11
Eastern Division of Westminster Sewers	- - -	- - -	- - -	-	8	625 13 5	70 14 11
		307 7 8					
HAMLET OF MILE-END OLD TOWN	- - -	- - -	- - -	-	4	5,520 14 4	195 15 9
WOOLWICH	- - -	- - -	114 6 11	-	2	1,038 9 10	16 12 7
ROTHERHITHE	- - -	- - -	- - -	-	2	5,810 15 6	85 12 1
ST. JOHN, HAMPSTEAD:							
Whole Parish	- - -	94 14 1	- - -	-	7	860 2 -	13 15 5
Ranelagh	- - -	- - -	- - -	-	3	348 15 3	56 15 1
Ditto, Bayswater Sewer	- - -	- - -	- - -	-	-	- - -	- - -
Western Division of Westminster Sewers	- - -	- - -	- - -	-	5	110 16 9	4 14 8
Holborn	- - -	- - -	- - -	-	8	217 11 7	10 18 7
		94 14 1					
WHITECHAPEL DISTRICT.							
ST. MARY, WHITECHAPEL:							
Whole Parish	132 11 7	- - -	- - -	-	11	1,204 1 4	19 5 7
Spitalfields, &c.	- - -	- - -	- - -	1,	1	2,725 6 7	119 16 4
Tower Hill	- - -	- - -	- - -		-	5 7 8	- - -
	132 11 7	- - -	- - -	1,			
CHRISTCHURCH, SPITALFIELDS	- - -	- - -	- - -	-	7	1,287 13 9	45 13 5
ST. BOTOLPH WITHOUT, ALDGATE:							
Whole Parish	56 15 7	- - -	- - -	-	6	515 13 3	8 5 1
Spitalfields, &c.	- - -	- - -	- - -	2	3	991 4 7	43 11 7
Tower Hill	- - -	- - -	- - -		-	33 17 6	- - 2
	56 15 7			3			
HOLY TRINITY, MINORIES	- - -	- - -	- - -	-	3	93 18 2	1 1 5
ST. KATHARINE (Precinct of)	- - -	75 11 4	- - -	-	9	222 3 1	2 17 6
HAMLET OF MILE-END NEW TOWN	- - -	- - -	- - -	-	4	519 19 -	18 8 10
LIBERTY OF NORTON FOLGATE	- - -	5 4 6	- - -	-	6	104 14 -	4 3 6
OLD ARTILLERY GROUND	- - -	- - -	- - -	-	1	147 9 4	5 4 7
TOWER (District of)	- - -	- - -	- - -	-	4	43 - 7	- 9 10
		80 15 10					
Carried forward (to p. 58) £.	- - -	- - -	2,317 2 6	-	-	270,294 18 6	13,380 3 5

		MAIN INTERCEPTING DRAINAGE.			GENERAL PURPOSES.	TOTAL RECEIPTS.
District Rates.	Improvement Rates.	&c.	Investments.	Total.	Contributions, &c.	
		st.	Sale of and Interest on Exchequer Bills.		Incidental Receipts.	
£. s. d.	£. s. d.	d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
28,626 10 11	- - - -	11	2,761 6 11	5,076 1 10	9 14 1	34,152 9 3
- - - -	- - - -	4	98 19 5	181 18 9	- 6 11	182 5 8
359 18 2	- - - -	-	- - - -	- - - -	- - - -	360 2 4
564 15 8	- - - -	-	- - - -	- - - -	- - - -	564 17 8
1,713 15 2	- - - -	5	66 14 2	122 12 7	- 4 8	1,837 13 3
729 13 8	- - - -	9	50 18 6	93 12 3	- 3 7	838 9 3
826 7 6	- - - -	8	53 15 8	98 17 4	- 3 9	935 8 6
- - - -	- - - -	11	67 16 3	124 13 2	- 4 9	124 17 11
271 18 9	- - - -	-	- - - -	- - - -	- - - -	511 3 -
7 16 10	- - - -	-	- - - -	- - - -	- - - -	7 17 6
- - - -	- - - -	-	- - - -	- - - -	- - - -	- - 4
- - - -	- - - -	3	102 2 6	187 14 9	- 7 2	188 1 11
4 4 3	- - - -	-	- - - -	- - - -	- - - -	4 4 4
303 8 3	- - - -	-	- - - -	- - - -	- - - -	303 8 11
64 11 8	- - - -	-	- - - -	- - - -	- - - -	64 16 2
374 12 4	- - - -	8	61 8 4	112 18 -	- 4 4	792 10 11
- - - -	- - - -	11	37 19 10	69 16 9	- 2 8	69 19 5
396 1 11	- - - -	4	26 2 11	48 1 3	- 1 10	452 - 4
- - - -	- - - -	6	31 9 3	57 16 9	- 2 3	57 19 -
216 - 11	- - - -	-	- - - -	- - - -	- - - -	216 1 8
2 5 7	- - - -	-	- - - -	- - - -	- - - -	2 5 7
8 14 -	- - - -	-	- - - -	- - - -	- - - -	8 14 3
194 15 4	- - - -	-	- - - -	- - - -	- - - -	194 17 2
- - - -	- - - -	6	44 - 11	80 19 5	- 3 1	81 2 6
267 8 9	- - - -	-	- - - -	- - - -	- - - -	482 16 4
1 4 3	- - - -	-	- - - -	- - - -	- - - -	1 4 4
92 8 8	- - - -	2	14 6 6	26 6 8	- 1 -	189 13 5
- - - -	- - - -	3	18 17 3	34 13 6	- 1 4	34 14 10
68 8 2	- - - -	-	- - - -	- - - -	- - - -	146 10 5
5 7 2	- - - -	-	- - - -	- - - -	- - - -	5 7 6
5 4 -	- - - -	10	2 8 9	4 9 7	- - 2	9 14 1
- - - -	- - - -	6	6 10 9	12 - 3	- - 6	12 1 7
35 3 7	- - - -	-	5 15 8	10 12 8	- - 5	74 8 7
80 17 2	- - - -	1	3 3 4	5 16 5	- - 3	86 15 2
10 5 9	- - - -	6	1 12 10	3 - 4	- - 1	21 8 5
2 18 11	- - - -	9	1 2 4	2 1 1	- - 1	5 - 4
35,228 17 4	- - - -	3	3,453 12 1	6,354 3 4	2 12 11	43,021 1 10

Continued on page 56.

KS.

ESTABLISHMENT.							LOANS, &c.			
Collectors' Poundage, &c.	Rent, Taxes, &c.	Office Repairs, Furniture, &c.	Stationery, Printing, &c.	Instruments, Maps, Plans, &c.	Miscellaneous Expenses.	Total.	Loans paid off.	Interest on Loans.	Annuities.	Total.
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
1,129 11 8	147 8 1	74 6 1	259 4 10	106 10 3	154 11 11	2,067 19 11	58 3 2	4,782 17 7	263 10 4	5,104 11 1
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
20 7 4	4 1 3	2 3 10	7 13 -	3 2 10	4 11 3	48 1 11	- - -	898 9 -	- - -	898 9 -
16 10 8	1 18 9	1 - 11	3 12 11	1 10 -	2 3 6	29 15 11	- - -	31 1 -	- - -	31 1 -
73 5 7	4 1 -	2 3 8	7 12 5	3 2 8	4 10 11	100 14 8	- - -	- - -	- - -	- - -
47 2 -	4 9 -	1 13 4	5 16 3	2 7 9	3 9 4	70 12 1	- - -	442 12 8	36 18 10	479 11 6
49 14 11	4 13 11	1 15 2	6 2 10	2 10 6	3 13 3	74 11 6	- - -	467 9 8	39 - 5	506 10 1
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
18 8 -	2 18 8	1 11 8	5 10 5	2 5 4	3 5 10	38 12 11	- - -	120 11 1	- - -	120 11 1
1 1 11	- 15 7	- 8 5	1 9 3	- 12 -	- 17 5	6 9 6	- - -	- - -	- - -	- - -
- - 7	- 8 1	- 4 4	- 15 2	- 6 3	- 9 1	2 15 10	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- 3 -	- 2 9	- 1 6	- 5 3	- 2 2	- 3 2	1 1 3	- - -	2 16 1	- - -	2 16 1
4 15 9	- 16 1	- 8 8	1 10 4	- 12 6	- 18 1	10 3 3	- - -	- - -	- - -	- - -
4 8 11	5 4 11	2 16 8	9 17 7	4 1 2	5 17 10	39 - 2	- - -	- - -	- - -	- - -
23 7 5	3 14 6	2 - 2	7 - 3	2 17 7	4 3 8	49 1 8	- - -	153 2 4	- - -	153 2 4
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
24 3 7	2 5 7	- 17 1	2 19 8	1 4 6	1 15 7	36 4 7	- - -	227 4 9	18 19 4	246 4 1
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
6 9 10	- 15 3	- 8 3	1 8 8	- 11 9	- 17 1	11 14 -	- - -	12 4 -	- - -	12 4 -
- 3 4	- -	- -	- -	- -	- -	- 3 4	- - -	- - -	- - -	- - -
- 5 3	- 4 11	- 2 8	- 9 3	- 3 9	- 5 6	1 17 2	- - -	4 18 6	- - -	4 18 6
4 17 11	- 16 4	- 8 10	1 10 11	- 12 9	- 18 5	10 5 1	- - -	5 18 5	- - -	5 18 5
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
16 11 6	2 12 10	1 8 6	4 19 6	2 - 10	2 19 4	34 16 3	- - -	108 12 6	- - -	108 12 6
- - 1	- - 7	- - 4	- 1 1	- - 5	- 2 2	- 6 2	- - -	- - -	- - -	- - -
5 9 1	- 17 4	- 9 5	1 12 9	- 13 5	- 19 6	11 9 1	- - -	35 14 4	- - -	35 14 4
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
6 - 8	- 19 2	- 10 4	1 16 2	- 14 11	1 1 7	12 13 4	- - -	39 10 1	- - -	39 10 1
- - 9	- 3 8	- 1 11	- 6 11	- 2 10	- 13 6	1 19 1	- - -	- - -	- - -	- - -
- - 7	- 3 -	- 1 7	- 5 7	- 2 3	- 10 11	1 11 7	- - -	- - -	- - -	- - -
- - -	- 7 11	- 4 3	- 14 11	- 6 2	- 8 11	2 11 8	- - -	- - -	- - -	- - -
2 4 1	- 7 -	- 3 9	- 13 2	- 5 5	- 7 10	4 12 5	- - -	14 8 5	- - -	14 8 5
3 9 6	- 3 10	- 2 1	- 7 3	- 3 -	- 4 4	4 15 8	- - -	- - -	- - -	- - -
- 12 7	- 2 -	- 1 1	- 3 9	- 1 7	- 2 3	1 6 5	- - -	4 1 8	- - -	4 1 8
- - 3	- 1 4	- - 9	- 2 6	- 1 1	- 5 -	- 14 6	- - -	- - -	- - -	- - -
,459 6 9	190 13 4	95 15 3	334 2 7	137 5 8	200 7 2	2,676 - 11	58 3 2	7,351 12 1	358 8 11	7,768 4 2

- - - - - - - - - - - - - - - - - - PAYMENTS

- - - SEWERAGE AND DRAINAGE.						METROPOLIS IMPROVEMENTS.	MAIN INTERCEPTING DRAINAGE.			AL ENTS.
CONTINGENCIES.					TOTAL.		LOANS, &c.			
Law and Parliamentary Expenses.	Retiring Allowances.	Temporary Allowances, &c.	Sums Refunded.	Total.			Loans paid off.	Interest on Loans.	Total.	
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	s. d.
11 13 8	652 1 2	13 3 9	205 15 1	882 13 8	57,181 16 -	- - -	4,193 9 5	3,473 4 9	7,666 14 2	12 6
- - -	- - -	- - -	- - -	- - -	- - -	- - -	150 6 1	124 9 10	274 15 11	11 10
- - -	15 - 11	- 7 9	12 7 6	27 16 2	7,114 15 7	- - -	- - -	- - -	- - -	15 7
- - -	8 1 6	- 3 9	- 1 9	8 7 -	1,054 4 4	- - -	- - -	- - -	- - -	4 4
- - -	24 - 4	- 7 9	- - -	24 8 1	1,176 3 5	- - -	101 6 1	83 18 2	185 4 3	13 4
- 13 -	11 10 2	- 5 11	- - -	12 9 1	1,702 3 3	- - -	77 6 8	64 1 1	141 7 9	7 2
- 13 8	12 3 2	- 6 3	- - -	13 3 1	1,797 16 -	- - -	81 13 7	67 12 11	149 6 6	13 10
- - -	- - -	- - -	- - -	- - -	- - -	- - -	102 19 8	85 5 10	188 5 6	15 10
- - -	17 14 5	- 5 7	- 1 11	18 1 11	1,312 10 8	- - -	- - -	- - -	- - -	10 8
- - -	4 12 -	- 1 6	- - -	4 13 6	44 8 6	- - -	- - -	- - -	- - -	8 6
- - -	2 10 10	- - 9	- - -	2 11 7	13 7 -	- - -	- - -	- - -	- - -	7 -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	155 1 10	128 9 1	283 10 11	19 11
- - 4	- 13 8	- - 3	- - -	- 14 3	54 14 10	- - -	- - -	- - -	- - -	14 10
- - -	- 1 8	- 1 6	29 7 -	29 10 2	226 10 2	- - -	- - -	- - -	- - -	10 2
1 6 5	26 15 11	- 10 1	- - -	28 12 5	1,867 1 3	- - -	- - -	- - -	- - -	1 3
- - -	22 10 3	- 7 2	- 2 6	22 19 11	1,667 2 1	- - -	93 5 5	77 5 -	170 10 5	4 6
- - -	- - -	- - -	- - -	- - -	- - -	- - -	57 13 11	47 15 8	105 9 7	10 3
- 6 8	5 17 11	- 3 -	- - -	6 7 7	873 16 1	- - -	39 14 1	32 17 8	72 11 9	15 5
- - -	- - -	- - -	- - -	- - -	- - -	- - -	47 15 8	39 11 6	87 7 2	12 3
- - -	3 3 8	- 1 6	- - 9	3 5 11	414 3 3	- - -	- - -	- - -	- - -	3 3
- - -	- - -	- - -	- - -	- - -	- 3 4	- - -	- - -	- - -	- - -	3 4
- - 8	1 2 7	- - 6	- - -	1 3 9	96 4 3	- - -	- - -	- - -	- - -	4 3
- - 4	5 15 5	- 1 7	- - -	5 17 4	147 1 -	- - -	- - -	- - -	- - -	1 -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	66 17 10	55 8 1	122 5 11	- 8
- - -	15 19 3	- 5 1	- 1 9	16 6 1	1,182 12 3	- - -	- - -	- - -	- - -	12 3
- - -	- 5 1	- - 1	- - -	- 5 2	1 1 11	- - -	- - -	- - -	- - -	1 11
- - -	5 5 2	- 1 8	- - 7	5 7 5	388 17 1	- - -	21 15 1	18 - 5	39 15 6	10 8
- - -	- - -	- - -	- - -	- - -	- - -	- - -	28 13 -	23 14 6	52 7 6	- 8
- - -	5 16 2	- 1 10	- - 8	5 18 8	430 2 9	- - -	- - -	- - -	- - -	2 9
- - -	1 12 -	- - 4	- - -	1 12 4	6 18 1	- - -	- - -	- - -	- - -	18 1
- - -	1 5 9	- - 3	- - -	1 6 -	5 11 4	- - -	3 14 -	3 1 3	6 15 3	6 1
- - -	- - 10	- - 9	- - -	- 1 7	2 14 7	- - -	9 18 6	8 4 5	18 2 11	4 5
- - -	2 2 5	- - 8	- - 3	2 3 4	157 - 2	- - -	8 15 8	7 5 6	16 1 2	9 7
- - -	1 2 7	- - 4	- - -	1 2 11	55 18 1	- - -	4 16 2	3 19 8	8 15 10	9 -
- - -	- 11 10	- - 2	- - 1	- 12 1	44 10 5	- - -	2 9 10	2 1 3	4 11 1	6 6
- - -	- 11 10	- - 2	- - -	- 12 -	2 11 3	- - -	1 13 11	1 8 1	3 2 -	9 8
14 14 9	848 8 6	16 19 11	247 19 10	1,128 3 -	79,021 18 11	- - -	5,249 6 5	4,347 14 8	9,597 1 1	3 3

ACCOUNT IN A

PARISHES, DISTRICTS, AND PARTS.	CASH BALANCES, 1st				SSETS AND LIABILITIES ON 25th MARCH 1857.		
	In Debt.				ing to rd.	Debts owing by the Board.	
						Mortgage Loans and other Standing Liabilities.	Current Liabilities.
	£. s. d.	£. s. d.	£. s. d.	£.	. d.	£. s. d.	£. s. d.
Brought forward (from p. 64)	- - -	- - -	2,317 2 6	-	–	270,294 18 6	13,380 3 5
WESTMINSTER DISTRICT.							
St. Margaret and St. John:							
Whole Parishes	- - -	313 10 7	- - -	-	–	2,847 9 7	45 11 10
Counter's Creek	- - -	- - -	- - -	-	10	583 1 7	136 6 2
Ranelagh	- - -	- - -	- - -	-	9	482 7 –	78 9 11
Western Division of Westminster Sewers	- - -	- - -	- - -	-	8	2,324 11 –	99 4 8
		313 10 7					
GREENWICH DISTRICT.							
St. Paul, Deptford (including Hatcham):							
Whole Parish	121 18 8	- - -	- - -	-	4	1,107 7 10	17 14 8
Surrey and Kent	- - -	- - -	- - -	85	3	3,898 7 8	69 9 2
Greenwich	295 13 8	- - -	- - -	-	6	3,123 14 9	43 8 6
	417 12 4	332 1 11		85			
St. Nicholas, Deptford	- - -	6 19 11	- - -	-	6	1,426 11 10	26 15 1
Greenwich	- - -	1,170 1 4	- - -	-	6	12,142 8 3	171 12 4
			1,509 3 2				
WANDSWORTH DISTRICT.							
Clapham	- - -	- - -	- - -	-	1	7,490 8 3	110 7 –
Tooting Graveney:							
Whole Parish	12 1 5	- - -	- - -	-	9	109 12 11	1 15 2
Surrey and Kent	- - -	- - -	- - -	1	2	103 3 4	1 10 –
Wandle	85 12 8	- - -	- - -	-	9	- - - -	– 5 7
	97 14 1	96 – 5		1			
Streatham:							
Whole Parish	59 17 7	- - -	- - -	-	1	543 16 3	8 14 2
Surrey and Kent	- - -	- - -	- - -	52	11	2,955 2 10	43 – 2
Wandle	116 8 5	- - -	- - -	-	10	- - - -	– 7 7
	176 6 –	123 14 4		52			
St. Mary, Battersea (excluding Penge)	- - -	8 18 9	- - -	-	9	7,181 15 10	105 16 –
Wandsworth:							
Whole Parish	53 19 6	- - -	- - -	-	4	490 4 3	- - - -
Surrey and Kent	- - -	- - -	- - -	7	2	281 6 2	11 18 9
Wandle	223 13 4	- - -	- - -	-	3	- - - -	– 14 6
	277 12 10	270 5 7		7			
Putney (including Roehampton)	- - -	43 – 8	- - -	-	4	390 16 7	17 3 10
		541 19 9	519 9 2				
HACKNEY DISTRICT.							
Hackney:							
Whole Parish	285 2 4	- - -	- - -	-	6	2,589 8 11	41 9 2
Spitalfields, &c.	- - -	- - -	- - -	594	8	1,302 4 2	57 5 –
Hackney Brook	- - -	- - -	- - -	1,516	6	3,697 16 11	496 15 11
	285 2 4			2,111			
St. Mary, Stoke Newington	- - -	15 9 3	- -	-	4	362 2 2	14 8 8
		15 9 3					
ST. GILES' DISTRICT.							
St. Giles and St. George, Bloomsbury:							
Whole Parishes	- - -	322 9 5	- - -	-	9	2,928 13 8	46 17 10
Eastern Division of Westminster Sewers	- - -	- - -	- - -	-	8	332 3 10	37 11 6
Holborn	- - -	- - -	- - -	-	–	987 1 4	49 11 9
		322 9 5					
Carried forward (to p. 62) £.	- - -	- - -	4,345 14 10	-	2	329,976 15 5	15,114 8 4

		MAIN INTERCEPTING DRAINAGE.			GENERAL PURPOSES.	TOTAL RECEIPTS.
District Rates.	Improvement Rates, &c.	, &c.	Investments.	Total.	Contributions, &c.	
		est.	Sale of and Interest on Exchequer Bills.		Incidental Receipts.	
£. s. d.	£. s. d.	. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
35,228 17 4	- - - -	1 3	3,456 12 1	6,354 3 4	12 2 11	43,021 1 10
- - - -	- - - -	6 5	104 3 4	191 9 9	- 7 4	191 17 1
8 1 7	- - - -	- -	- - - -	- - - -	- - - -	8 1 8
241 1 4	- - - -	- -	- - - -	- - - -	- - - -	241 2 2
147 3 2	- - - -	- -	- - - -	- - - -	- - - -	147 7 4
- - - -	- - - -	9 2	40 10 2	74 9 4	- 2 10	74 12 2
343 6 7	- - - -	- -	- - - -	- - - -	- - - -	349 7 9
7 18 3	- - - -	- -	- - - -	- - - -	- - - -	35 3 11
70 12 10	- - - -	17 -	8 3 5	15 - 5	- - 7	87 8 9
25 5 2	- - - -	1 10	49 - 5	90 2 3	- 3 5	205 4 3
497 13 11	- - - -	5 -	33 14 -	61 19 -	- 2 5	569 14 8
- - - -	- - - -	7 3	4 - 3	7 7 6	- - 3	7 7 9
6 15 4	- - - -	- -	- - - -	- - - -	- - - -	6 18 6
4 3 2	- - - -	- -	- - - -	- - - -	- - - -	5 14 6
- - - -	- - - -	13 6	19 17 11	36 11 5	- 1 5	36 12 10
211 2 2	- - - -	- -	- - - -	- - - -	- - - -	215 11 -
6 3 5	- - - -	- -	- - - -	- - - -	- - - -	8 10 -
354 11 7	- - - -	1 9	32 6 3	59 8 -	- 2 3	423 4 5
- - - -	- - - -	- 8	17 18 8	32 19 4	- 1 3	33 - 7
29 11 1	- - - -	- -	- - - -	- - - -	- - - -	30 - 3
17 8 8	- - - -	- -	- - - -	- - - -	- - - -	24 - -
- - - -	- - - -	19 9	14 5 11	- 5 8	- 1 -	26 6 8
- - - -	- - - -	8 2	94 14 7	174 2 9	- 6 8	174 9 5
136 4 6	- - - -	- -	- - - -	- - - -	- - - -	239 6 8
289 - 11	- - - -	- -	- - - -	- - - -	- - - -	289 19 3
328 10 11	- - - -	3 7	10 19 -	20 2 7	- - 9	349 - 11
- - - -	- - - -	16 3	107 2 9	196 19 -	- 7 6	197 6 6
34 2 2	- - - -	- -	- - - -	- - - -	- - - -	34 4 6
749 13 1	- - - -	- -	- - - -	- - - -	- - - -	750 - 2
38,737 7 2	- - - -	11 7	3,993 8 9	7,341 - 4	14 - 7	47,782 15 6

WORKS.

H 1857.

N A G E.

Establishment.							Loans, &c.			
Collectors' Poundage, &c.	Rent, Taxes, &c.	Office Repairs, Furniture, &c.	Stationery, Printing, &c.	Instruments, Maps, Plans, &c.	Miscellaneous. Expenses.	Total.	Loans paid off.	Interest on Loans.	Annuities.	Total.
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
1,459 6 9	190 13 4	95 15 3	334 2 7	137 5 8	200 7 2	2,676 - 11	58 3 2	7,351 12 1	358 8 11	7,768 4 2
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- -
- 11 8	- 2 4	- 1 3	- 4 5	- 1 10	- 2 7	1 7 6	- - -	25 13 4	- - -	25 13 4
8 19 9	1 1 -	- 11 4	1 19 8	- 16 3	1 3 8	16 3 8	- - -	16 17 6	- - -	16 17 6
5 9 3	5 2 11	2 15 7	9 13 10	3 19 7	5 15 7	39 1 3	- - -	103 4 4	- - -	103 4 4
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
18 8 1	1 14 11	- 13 -	2 5 5	- 18 8	1 7 1	27 11 10	- - -	172 18 10	14 8 11	187 7 9
1 3 3	- 15 10	- 8 6	1 9 9	- 12 3	- 17 9	7 6 6	837 15 2	162 2 10	- - -	999 18 -
5 13 6	- 10 8	- 4 -	- 14 -	- 5 9	- 8 4	8 9 11	- - -	53 5 4	4 8 10	57 14 2
4 - 5	2 14 7	1 9 6	5 2 10	2 2 3	3 1 4	25 6 6	2,897 2 3	560 14 1	- - -	3,457 16 4
31 3 5	2 18 9	1 2 1	3 16 11	1 11 7	2 5 11	46 14 5	- -	292 18 9	24 9 3	317 8 -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- 9 9	- - 11	- - 4	- 1 2	- - 6	- - 8	- 14 5	- - -	4 11 9	- 7 10	4 19 7
1 2 7	- 4 3	- 2 3	- 7 11	- 3 3	- 13 2	3 8 -	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
14 - 7	1 6 7	- 9 11	1 14 7	- 14 3	1 - 8	21 - 8	- - -	131 15 7	10 19 11	142 15 6
1 10 9	- 5 9	- 3 1	- 10 10	- 4 5	- 17 10	4 12 5	- - -	- - -	- - -	- - -
29 17 8	2 16 6	1 1 2	3 13 9	1 10 4	2 4 -	44 16 -	- - -	280 17 2	23 8 11	304 6 1
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
1 6 8	- 2 6	- - 11	- 3 4	- 1 4	- 1 11	2 - -	- - -	12 10 8	1 - 11	13 11 7
2 19 2	- 11 -	- 5 11	1 - 9	- 8 6	1 14 4	8 17 5	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- -
7 18 5	1 5 3	- 13 7	2 7 6	- 19 6	1 8 4	16 12 7	- - -	51 18 -	- - -	51 18 -
10 13 6	3 10 6	1 18 1	6 12 9	2 14 7	3 19 2	36 6 3	- - -	146 15 9	- - -	146 15 9
12 - 9	- 13 3	- 7 2	1 5 -	- 10 3	- 15 -	16 10 9	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
2 7 2	2 15 9	1 10 1	5 4 11	2 3 1	3 2 7	20 14 2	- - -	- - -	- - -	- - -
22 4 9	3 14 6	2 - 3	7 - 2	2 17 7	4 3 7	46 11 5	- - -	26 17 2	- - -	26 17 2
1,641 7 10	223 1 1	111 13 3	389 12 1	160 1 5	235 10 8	3,070 6 7	3,793 - 7	9,394 13 2	437 13 6	13,625 7 3

PAYMENT

SEWERAGE AND DRAINAGE.						METROPOLIS IMPROVEMENTS.	MAIN INTERCEPTING DRAINAGE.		
Contingencies.					Total.		Loans, &c.		
Law and Parliamentary Expenses. £. s. d.	Retiring Allowances. £. s. d.	Temporary Allowances, &c. £. s. d.	Sums Refunded. £. s. d.	Total. £. s. d.	£. s. d.	£. s. d.	Loans paid off. £. s. d.	Interest on Loans. £. s. d.	Total. £. s. d.
14 14 9	848 8 6	16 19 11	247 19 10	1,128 3 -	79,021 18 11	- - -	5,249 6 5	4,347 14 8	9,597 1 1
- - -	- - -	- - -	- - -	- - -	- - -	- - -	158 3 10	131 - 6	289 4 4
- - -	- 8 7	- - 3	- 7 1	- 15 11	203 5 3	- - -	- -	- - -	- - -
- - -	4 7 7	- 2 -	- 1 -	4 10 7	572 15 1	- - -	- - -	- - -	- - -
- 12 7	23 17 4	- 9 10	- - -	24 19 9	2,017 11 -	- - -	- - -	- - -	- - -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	61 10 5	50 19 1	112 9 6
- 5 1	4 9 11	- 2 4	- - -	4 17 4	665 4 10	- - -	- - -	- - -	- - -
14 9 9	5 5 10	- 1 6	- - -	19 17 1	1,572 11 8	- - -	- - -	- - -	- - -
- 1 7	1 7 8	- - 8	- - -	1 9 11	204 18 1	- - -	12 8 2	10 5 6	22 13 8
50 1 11	18 6 1	- 5 3	- - -	68 13 3	5,438 4 6	- - -	74 8 11	61 13 2	136 2 1
- 8 7	7 12 6	- 3 11	- - -	8 5 -	1,126 8 5	- - -	51 3 7	42 7 10	93 11 5
- - -	- - -	- - -	- - -	- - -	- - -	- - -	6 1 10	5 - 11	11 2 9
- - 2	- 2 2	- - 1	- - -	- 2 5	17 13 5	- - -	- - -	- - -	- - -
- - -	- - 5	- - 5	- - -	- - 10	99 4 9	- - -	- - -	- - -	- - -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	30 4 3	25 - 5	55 4 8
- 3 10	3 8 4	- 1 9	- - -	3 13 11	506 13 7	- - -	- - -	- - -	- - -
- - -	- - 7	- - 7	- - -	- 1 2	134 18 4	- - -	- - -	- - -	- - -
- 8 3	7 6 5	- 3 9	- - -	7 18 5	1,079 19 8	- - -	49 1 5	40 12 10	89 14 3
- - -	- - -	- - -	- - -	- - -	- - -	- - -	27 4 8	22 11 2	49 15 10
- - 4	- 6 10	- - 2	- - -	- 7 4	48 5 -	- - -	- - -	- - -	- - -
- - -	- 1 2	- 1 1	- - -	- 2 3	259 3 8	- - -	- - -	- - -	- - -
- - -	- - -	- - -	- - -	- -	- - -	- - -	21 14 3	17 19 8	39 13 11
- - -	- - -	- - -	- - -	- - -	- - -	- - -	143 17 2	119 3 -	263 - 2
- - -	7 12 7	- 2 5	- - 10	7 15 10	565 1 5	- - -	- - -	- - -	- - -
- - -	21 4 5	- 6 9	- - -	21 11 2	1,569 6 4	- - -	- - -	- - -	- - -
- - -	3 19 1	- 1 3	- - -	4 - 4	193 3 10	- - -	16 12 8	13 15 6	30 8 2
- - -	- - -	- - -	- - -	- - -	- - -	- - -	162 14 1	134 15 2	297 9 3
- 14 -	14 4 6	- 5 4	- - -	15 3 10	991 5 4	- - -	- - -	- - -	- - -
- 1 4	26 3 2	- 7 1	- - -	26 11 7	666 15 11	- - -	- - -	- - -	- - -
82 2 2	998 13 8	19 16 4	248 8 9	1,349 - 11	96,954 9 -	- - -	6,064 11 8	5,022 19 5	11,087 11 1

ACCOUNT IN

PARISHES, DISTRICTS, AND PARTS.	CASH BALANCES, In Debt.				SSETS AND LIABILITIES ON 25TH MARCH 1857. he	Debts owing by the Board. Mortgage Loans and other standing Liabilities.	Current Liabilities.
	£. s. d.	£. s. d.	£. s. d.		d.	£. s. d.	£. s. d.
Brought forward (from p. 58)	- - -	- - -	4,345 14 10	-	2	329,976 15 5	15,114 8 4
HOLBORN DISTRICT.							
St. Andrew and St. George-the-Martyr	- - -	143 – 6	- - -	-	8	2,343 15 –	67 5 10
St. Sepulchre	- - -	12 16 6	- - -	-	11	239 13 11	9 11 1
Saffron Hill, &c. (Liberty of)	- - -	30 5 6	- - -	-	6	508 7 5	14 4 2
Glasshouse Yard (Liberty of)	- - -	2 7 5	- - -	-	8	52 7 4	1 19 2
			188 9 11				
STRAND DISTRICT.							
St. Anne, Soho	- - -	- - -	- - -	-	6	1,280 6 3	46 9 11
St. Paul, Covent Garden	- - -	- - -	- - -	-	5	613 – 11	22 5 2
Savoy (Precinct of the)	- - -	- - -	- - -	-	1	120 17 5	4 7 9
St. Mary-le-Strand	- - -	- - -	- - -	-	9	209 16 7	7 12 4
St. Clement Danes	- - -	- - -	- - -	-	6	1,199 7 6	43 11 1
Liberty of the Rolls	- - -	17 11 3	- - -	-	1	285 8 9	8 3 11
		17 11 3					
FULHAM DISTRICT.							
St. Peter and St. Paul, Hammersmith:							
Whole Parish	82 19 11	- - -	- - -	-	1	753 14 10	412 1 4
Counter's Creek	- - -	- - -	- - -		8	875 18 4	204 15 3
Fulham, &c.	- - -	- - -	- - -	3	10	13,069 5 1	723 6 10
	82 19 11			3			
Fulham:							
Whole Parish	58 7 10	- - -	- - -	-	8	530 6 6	8 9 10
Counter's Creek	- - -	- - -	- - -	1	5	2,826 16 1	660 16 7
Fulham, &c.	- - -	- - -	- - -	1	–	5,354 4 11	296 6 10
	58 7 10			2			
LIMEHOUSE DISTRICT.							
St. Anne, Limehouse:							
Whole Parish	68 4 2	- - -	- - -	-	1	619 9 7	9 18 4
Spitulfields, &c.	- - -	- - -	- - -		2	616 10 11	27 2 1
Limehouse	144 3 9	- - -	- - -	-	-	332 10 6	– 17 6
Upper ditto	72 17 8	- - -	- - -	-	-	44 11 5	– – 3
Poplar, &c.	- - -	- - -	- - -		-	2 14 8	3 3 6
	285 5 7	12 6 10					
St. John, Wapping:							
Whole Parish	43 9 2	- - -	- - -	-	–	394 13 5	6 6 5
Spitalfields, &c.	- - -	- - -	- - -		5	523 4 11	23 – 1
Lower Wapping	54 11 –	- - -	- - -	-	3	32 14 10	– 12 11
Hermitage Street	- - -	- - -	- - -		-	11 9 1	– – 1
	98 – 2						
St. Paul, Shadwell:							
Whole Parish	37 17 7	- - -	- - -	-	9	344 – 5	5 10 2
Spitalfields, &c.	- - -	- - -	- - -		1	605 4 –	26 12 2
Lower Wapping	34 9 7	- - -	- - -	-	9	20 13 11	– 8 3
	72 7 2						
Ratcliffe (Hamlet of)	- - -	- - -	- - -	-	8	1,610 19 2	57 2 8
		12 6 10					
Carried forward (to p. 66) £.	- - -	- - -	4,534 4 9	-	1	365,398 19 1	17,806 9 10

		MAIN INTERCEPTING DRAINAGE.			GENERAL PURPOSES.	
		&c.	INVESTMENTS.		CONTRIBUTIONS, &c.	
DISTRICT RATES.	IMPROVEMENT RATES, &c.	t.	Sale of and Interest on Exchequer Bills.	TOTAL.	Incidental Receipts.	TOTAL RECEIPTS.
£. s. d.	£. s. d.	d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
38,737 7 2	- - - -	7	3,993 8 9	7,341 0 4	14 - 7	47,782 15 6
614 15 11	- - - -	1	53 18 6	99 2 7	- 3 9	714 8 1
168 16 7	- - - -	7	7 5 -	13 6 7	- - 6	182 5 9
127 6 -	- - - -	10	11 7 8	20 18 6	- - 10	148 6 6
39 11 3	- - - -	11	1 9 9	2 14 8	- - 1	42 6 6
27 19 6	- - - -	-	37 - 10	68 1 10	- 2 7	96 5 10
12 19 -	- - - -	4	17 14 8	32 12 -	- 1 3	45 13 2
1 16 1	- - - -	8	3 9 11	6 8 7	- - 3	8 5 1
3 19 5	- - - -	9	6 1 5	11 3 2	- - 5	15 3 3
23 16 6	- - - -	9	34 14 -	63 15 9	- 2 5	87 16 4
70 6 11	- - - -	1	6 11 4	12 1 5	- - 6	82 9 7
- - - -	- - - -	3	27 11 6	50 13 9	- 1 11	50 15 8
13 4 11	- - - -	-	- - - -	- - - -	- - - -	13 5 1
137 5 9	- - - -	-	- - - -	- - - -	- - - -	137 7 1
- - - -	- - - -	3	19 8 -	35 13 8	- 1 5	35 14 8
43 7 2	- - - -	-	- - - -	- - - -	- - - -	43 7 8
57 - 11	- - - -	-	- - - -	- - - -	- - - -	57 1 6
- - - -	- - - -	11	22 13 3	41 13 2	- 1 7	41 14 9
61 10 10	- - - -	-	- - - -	- - - -	- - - -	110 7 10
289 11 9	- - - -	-	- - - -	- - - -	- - - -	289 14 5
143 - -	- - - -	-	- - - -	- - - -	- - - -	143 2 4
2 14 1	- - - -	-	- - - -	- - - -	- - - -	12 6 2
- - -	- - - -	-	14 8 9	26 10 9	- 1 -	26 11 9
42 7 3	- - - -	-	- - - -	- - - -	- - - -	83 14 5
2 10 10	- - - -	-	- - - -	- - - -	- - - -	2 12 4
- - - -	- - - -	-	- - - -	- - - -	- - - -	- - 5
- - - -	- - - -	-	12 11 9	23 2 9	- - 11	23 3 8
49 8 1	- - - -	-	- - - -	- - - -	- - - -	97 5 -
1 12 4	- - - -	-	- - - -	- - - -	- - - -	1 13 4
97 2 8	- - - -	6	17 18 5	32 18 11	- 1 3	218 16 2
40,769 10 11	- - - -	6	4,287 13 6	7,881 18 -	15 1 3	50,594 9 10

WORKS.

CH 1857.

Establishment.							Loans, &c.			
Collectors' Poundage, &c.	Rent, Taxes, &c.	Office Repairs, Furniture, &c.	Stationery, Printing, &c.	Instruments, Maps, Plans, &c.	Miscellaneous Expenses.	Total.	Loans paid off.	Interest on Loans.	Annuities.	Total.
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
1,641 7 10	223 1 1	111 13 3	389 12 1	160 1 5	235 10 8	3,070 6 7	3,793 – 7	9,394 13 2	437 13 6	13,625 7 3
19 11 11	3 5 7	1 15 4	6 3 5	2 10 8	3 13 7	41 – 3	- - -	23 13 4	- - -	23 13 4
7 19 1	– 8 10	– 4 9	– 16 6	– 6 10	– 9 11	10 18 9	- - -	- - -	- - -	- - -
4 2 5	– 13 10	– 7 5	1 5 11	– 10 8	– 15 6	8 12 9	- - -	4 19 4	- - -	4 19 4
1 10 3	– 1 8	– – 11	– 3 2	– 1 3	– 1 10	2 1 1	- - -	- - -	- - -	- - -
1 18 –	2 4 11	1 4 3	4 4 7	1 14 9	2 10 5	16 13 11	- - -	- - -	- - -	- - -
– 18 3	1 1 6	– 11 7	2 – 6	– 16 8	1 4 2	8 – –	- - -	- - -	- - -	- - -
– 3 7	– 4 3	– 2 3	– 8 –	– 3 3	– 4 9	1 11 6	- - -	- - -	- - -	- - -
– 6 4	– 7 4	– 4 –	– 13 10	– 5 8	– 8 3	2 14 9	- - -	- - -	- - -	- - -
1 15 7	2 2 1	1 2 9	3 19 3	1 12 7	2 7 3	15 12 10	- - -	- - -	- - -	- - -
2 7 7	– 8 –	– 4 4	– 15 –	– 6 2	– 8 11	4 19 9	- - -	2 17 8	- - -	2 17 8
- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
– 17 6	– 3 6	– 1 11	– 6 7	– 2 8	– 3 11	2 1 5	- - -	38 11 3	- - -	38 11 3
12 11 7	1 10 –	– 16 2	2 16 5	1 3 2	2 – 8	24 12 8	- - -	584 7 6	- - -	584 7 6
- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
2 16 5	– 11 3	– 6 1	1 1 2	– 8 9	– 12 8	6 13 3	- - -	124 8 8	- - -	124 8 8
5 3 –	– 12 3	– 6 7	1 3 1	– 9 6	– 16 7	10 1 7	- - -	239 8 3	- - -	239 8 3
- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
3 15 –	– 11 11	– 6 5	1 2 6	– 9 3	– 13 5	7 17 6	- - -	24 11 5	- - -	24 11 5
12 – –	– 8 2	– 4 5	– 15 4	– 6 4	– 9 2	15 7 11	- - -	12 15 7	- - -	12 15 7
5 16 8	– 6 11	– 3 9	– 13 –	– 5 4	– 7 9	8 13 9	- - -	- - -	- - -	- - -
– 7 2	– – 5	– – 3	– – 10	– – 4	– – 6	– 10 7	- - -	- - -	- - -	- - -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
3 3 7	– 10 2	– 5 6	– 19 1	– 7 10	– 11 5	6 13 9	- - -	20 17 1	- - -	20 17 1
– 7 10	– 5 7	– 3 –	– 10 6	– 4 4	– 6 3	2 6 5	- - -	- - -	- - -	- - -
– – 1	– 1 9	– 1 –	– 3 4	– 1 4	– 2 –	1 3 11	- - -	- - -	- - -	- - -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
3 13 8	– 11 9	– 6 4	1 2 1	– 9 1	– 13 2	7 14 8	- - -	24 2 6	- - -	24 2 6
– 5 –	– 3 6	– 1 11	– 6 8	– 2 9	– 4 –	1 9 6	- - -	- - -	- - -	- - -
6 16 5	1 1 9	– 11 9	2 – 11	– 16 10	1 4 5	14 6 6	- - -	44 13 8	- - -	44 13 8
1,739 14 9	240 18 –	121 5 11	423 3 9	173 17 5	256 1 2	3,292 5 7	3,793 – 7	10,539 19 5	437 13 6	14,770 13 6

PAYM

SEWERAGE AND DRAINAGE.						METROPOLIS IMPROVEMENTS.	MAIN INTERCEPTING DRAIN		
CONTINGENCIES.					TOTAL.		LOANS, &c.		
Law and Parliamentary Expenses.	Retiring Allowances.	Temporary Allowances, &c.	Sums Refunded.	Total.			Loans paid off.	Interest on Loans.	Tota
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s
82 2 2	998 13 8	19 16 4	248 8 9	1,349 - 11	96,954 9 -	- - -	6,064 11 8	5,022 19 5	11,087 1
- 1 2	23 1 7	- 6 3	- - -	23 9 -	587 11 2	- - -	81 17 9	67 16 6	149 14
- -	2 12 5	- - 10	- - -	2 13 3	127 17 8	- - -	11 - 3	9 2 4	20 2
- - 3	4 16 10	- 1 4	- - -	4 18 5	123 8 9	- - -	17 5 9	14 6 5	31 12
- - -	- 9 11	- - 2	- - -	- 10 1	23 17 1	- - -	2 5 2	1 17 5	4 2
- 11 4	11 9 3	- 4 4	- - -	12 4 11	799 3 8	- - -	56 5 -	46 11 9	102 16
- 5 5	5 9 9	- 2 1	- - -	5 17 3	382 13 7	- - -	26 18 8	22 6 2	49 4
- 1 1	1 1 8	- - 5	- - -	1 3 2	75 9 2	- - -	5 6 2	4 8 -	9 14
- 1 10	1 17 5	- - 8	- - -	1 19 11	130 19 5	- - -	9 4 4	7 12 9	16 17
- 10 7	10 14 9	- 4 -	- - -	11 9 4	748 13 -	- - -	52 13 11	43 12 10	96 6
- - 2	2 16 1	- - 9	- - -	2 17 -	71 12 7	- - -	9 19 6	8 5 2	18 4
- - -	- - -	- - -	- - -	- - -	- - -	- - -	41 17 6	34 13 7	76 11
- - -	- 13 3	- - 4	- 10 8	1 4 3	305 7 5	- - -	- - -	- - -	- -
- - -	- 3 1	- 2 11	- - -	- 6 -	4,212 9 2	- - -	- - -	- - -	- -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	29 9 3	24 8 1	53 17
- - -	2 1 7	- 1 1	1 14 3	3 16 11	985 8 -	- - -	- - -	- - -	- -
- - -	- 1 3	- 1 2	- - -	- 2 5	1,724 2 4	- - -	- - -	- - -	- -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	34 8 4	28 10 1	62 18
- - -	3 12 1	- 1 2	- - 5	3 13 8	258 15 8	- - -	- - -	- - -	- -
- - -	2 10 -	- - 9	- - -	2 10 9	59 12 11	- - -	- - -	- - -	- -
- - -	2 4 6	- - 8	- - -	2 5 2	34 4 11	- - -	- - -	- - -	- -
- - -	- - 1	- - -	- - -	- - 1	11 9 -	- - -	- - -	- - -	- -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	21 18 6	18 3 3	40 1
- - -	3 1 6	- 1 -	- - 4	3 2 10	235 16 8	- - -	- - -	- - -	- -
- - -	1 13 1	- - 6	- - -	1 13 7	15 19 5	- - -	- - -	- - -	- -
- - -	- 11 5	- - 2	- - -	- 11 7	3 10 10	- - -	- - -	- - -	- -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	19 2 3	15 16 7	34 18
- - -	3 10 9	- 1 1	- - 5	3 12 3	262 12 4	- - -	- - -	- - -	- -
- - -	1 - 10	- - 4	- - -	1 1 2	10 2 -	- - -	- - -	- - -	- -
- - -	6 11 5	- 2 1	- - 9	6 14 3	486 9 7	- - -	27 4 4	22 10 10	49 15
83 14 -	1,090 18 2	21 10 5	250 15 7	1,446 18 2	108,631 15 4	- - -	6,511 8 4	5,393 1 2	11,904 9

ACCOUNT IN

LIABILITIES
ARCH, 1857.

PARISHES, DISTRICTS, AND PARTS.	CASH BALANCES, 1st J				Debts owing by the Board,	
	In Debt.				ge Loans other Liabilities.	Current Liabilities.
	£. s. d.	£. s. d.	£. s. d.	£.	s. d.	£. s. d.
Brought forward (from p. 62)	- - -	- - -	4,534 4 9	- -	98 19 1	17,806 9 10
POPLAR DISTRICT.						
ALL SAINTS, POPLAR:					729 19 6	27 14 –
Whole Parish	190 9 8	- - -	- - -	- -	99 10 8	13 3 4
Spitalfields, &c.	- - -	- - -	- - -	131	81 16 7	327 15 2
Poplar, &c.	- - -	- - -	- - -	438		
	190 9 8			569		
ST. MARY, STRATFORD-LE-BOW:					02 4 3	4 16 9
Whole Parish	33 5 6	- - -	- - -	- -	48 13 5	6 10 9
Hackney Brook	- - -	- - -	- - -	19		
	33 5 6	13 19 10		19		
ST. LEONARD, BROMLEY:					04 19 9	6 9 8
Whole Parish	44 11 10	- - -	- - -	- -	80 9 10	3 10 9
Spitalfields, &c.	- - -	- - -	- - -	43		
	44 11 10	1 – 9		43		
ST. SAVIOUR'S DISTRICT.		15 – 7			765 7 4	84 18 9
CHRISTCHURCH	- - -	– 4 6	- - -	-	852 8 –	130 8 3
ST. SAVIOUR (including Clink Liberty)	- - -	8 7 5	- - - 8 11 11	-		
PLUMSTEAD DISTRICT.						
CHARLTON:					329 8 4	5 5 6
Whole Parish	36 5 5	- - -	- - -	-	671 – 4	12 19 2
Ravensbourne	- - -	- - -	- - -	43		
	36 5 5			43	317 9 4	5 1 8
PLUMSTEAD	- - -	34 19 1	- - -	-		
ELTHAM:					166 7 7	2 13 3
Whole Parish	18 6 5	- - -	- - -	-	111 18 8	– 14 2
Ravensbourne	- - -	- - -	- - -	2		
	18 6 5	15 16 –		2		
LEE:					262 8 4	4 4 1
Whole Parish	28 17 10	- - -	- - -	-	,611 – 10	31 1 4
Ravensbourne	- - -	- - -	- - -	9		
	28 17 10			9		
KIDBROOKE:					96 – 8	1 10 9
Whole Liberty	10 11 6	- - -	- - -	-	242 2 3	3 7 4
Greenwich	22 18 4	- - -	- - -	-	439 9 9	4 4 1
Ravensbourne	- - -	- - -	- - -	1		
	33 9 10	19 11 –		1		
		70 6 1				
LEWISHAM DISTRICT.						
LEWISHAM (including SYDENHAM):					,214 18 6	19 9 1
Whole Parish	133 15 5	- - -	- - -	-	,610 16 1	36 5 11
Greenwich	247 2 8	- - -	- - -	-	,710 1 4	108 9 11
Ravensbourne	- - -	- - -	- - -	41		
	380 18 1			41	327 3 7	5 4 9
HAMLET OF PENGE	- - -	36 – 6	- - -	-		
		36 – 6	3 15 2			
Carried forward (to p. 70) £.	- - -	- - -	4,546 11 10	-	,274 14 –	18,652 8 3

		MAIN INTERCEPTING DRAINAGE.			GENERAL PURPOSES.	
		&c.	INVESTMENTS.		CONTRIBUTIONS, &c.	
DISTRICT RATES.	IMPROVEME RATES, &		Sale of and Interest on Exchequer Bills.	TOTAL.	Incidental Receipts.	TOTAL RECEIPTS.
£. s. d.	£. s.	d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
40,769 10 11	- - -	6	4,287 13 6	7,881 18 –	15 1 3	50,594 9 10
- - - -	- - -	–	63 5 9	116 6 9	– 4 5	116 11 2
30 – 2	- - -	- -	- - - -	- - - -	- - - -	53 13 2
279 12 –	- - -	- -	- - - -	- - - -	- - - -	1,270 2 2
- - - -	- -	4	11 1 1	20 6 5	– – 9	20 7 2
3 13 5	- -	- -	- - - -	- - - -	- - - -	3 13 6
- - - -	- -	5	14 16 4	27 4 9	– 1 1	27 5 10
9 19 6	- -	- -	- - - -	- - - -	- - - -	16 6 9
312 10 9	- -	11	25 18 10	47 13 9	– 1 10	367 14 9
447 13 9	- -	9	39 16 7	73 4 4	– 2 10	532 6 8
- - - -	- -	–	12 1 –	22 3 –	– – 10	22 3 10
– 9 3	- -	- -	- - - -	- - - -	- - - -	8 11 10
- - - -	- -	4 9	11 12 3	21 7 –	– 10	21 7 10
- - - -	- -	2 1	6 1 9	11 3 10	– – 5	11 4 3
– – 6	- -	- -	- - - -	- - - -	- - - -	– 9 11
- - - -	- -	– 11	9 12 –	17 12 11	– – 8	17 13 7
1 – 7	- -	- -	- - - -	- - -	- - - -	19 3 4
- - - -	- -	8 11	3 10 3	6 9 2	– – 3	6 9 5
– 15 10	- -	- -	- - - -	- - - -	- - - -	3 6 1
– 2 11	- -	- -	- - - -	- - - -	- - - -	2 14 –
- - - -	- -	5 2	44 8 11	81 14 1	– 3 2	81 17 3
5 18 9	- -	- -	- - - -	- - - -	- - - -	27 4 8
4 6 8	- -	- -	- - - -	- - - -	- - - -	81 13 9
- - - -	- -	– 8	11 19 4	22 – –	– – 10	22 – 10
41,865 15 –	- -	6 5	4,541 17 7	8,349 4 –	15 19 2	53,328 11 7

Continued on page 68.

)RKS.

857. -

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Establishment.							Loans, &c.			
ectors' ndage, &c.	Rent, Taxes, &c.	Office Repairs, Furniture, &c.	Stationery, Printing, &c.	Instruments, Maps, Plans, &c.	Miscellaneous Expenses.	Total.	Loans paid off.	Interest on Loans.	Annuities.	Total.
s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
14 9	240 18 –	121 5 11	423 3 9	173 17 5	256 1 2	3,292 5 7	3,793 – 7	10,539 19 5	437 13 6	14,770 13 6
16 6	– 5 10	– 3 2	– 10 11	– 4 6	– 6 6	3 16 8	- - -	11 18 10	- - -	11 18 10
3 7	2 6 9	1 5 3	4 8 –	1 16 2	2 12 6	27 17 11	- - -	- - -	- - -	- - -
– 2 10	– – 11	– – 6	– 1 9	– – 8	– 1 1	– 9 6	- - -	1 18 8	- - -	1 18 8
– 9 9	– 1 7	– – 10	– 2 11	– 1 3	– 1 9	1 – 8	- - -	3 4 2	- - -	3 4 2
3 19 10	2 5 4	– 17 –	2 19 3	1 4 4	1 15 4	35 19 4	- - -	225 9 4	18 16 4	244 5 8
6 16 9	3 9 7	1 6 1	4 10 11	1 17 4	2 14 3	55 4 6	- - -	346 4 –	28 18 1	375 2 1
– – 3	– 3 3	– 1 9	– 6 –	– 2 6	– 3 7	1 5 –	302 8 4	82 16 1	- - -	385 4 5
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- -	– – 3	– – 1	– – 5	– – 2	– – 3	– 1 8	20 5 2	5 11 –	- - -	25 16 2
– – 7	– 6 11	– 3 9	– 13 1	– 5 4	– 7 10	2 13 9	653 10 5	178 18 7	- - -	832 9 –
– 1 10	– 1 3	– – 8	– 2 4	– – 11	– 1 4	– 11 5	64 18 8	12 11 5	- - -	77 10 1
– – 1	– – 10	– – 5	– 1 7	– – 8	– – 11	– 6 7	79 10 9	21 15 8	- - -	101 6 5
– 19 5	– 13 2	– 7 1	1 4 10	– 10 3	– 14 10	6 2 5	700 3 11	135 10 3	- - -	835 14 2
– 3 –	1 15 11	– 19 5	3 7 8	1 7 9	2 – 4	13 18 6	3,386 2 2	927 2 8	- - -	4,313 4 10
- -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
4 9 2	252 9 7	126 11 11	441 13 5	181 9 3	267 1 8	3,441 13 6	9,000 – –	12,493 – 1	485 7 11	21,978 8 –

PAYMENTS

SEWERAGE AND DRAINAGE.						METROPOLIS IMPROVEMENTS.	MAIN INTERCEPTING DRAINAGE.			
CONTINGENCIES.					TOTAL.		LOANS, &c.			
Law and Parliamentary Expenses.	Retiring Allowances.	Temporary Allowances, &c.	Sums Refunded.	Total.			Loans paid off.	Interest on Loans.	Total.	Sal &
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£.
83 14 –	1,090 18 2	21 10 5	250 15 7	1,446 18 2	108,631 15 4	- - -	6,511 8 4	5,393 1 2	11,904 9 6	20,07
- - -	- - -	- - -	- - -	- - -	- - -	- - -	96 2 2	79 12 1	175 14 3	29
- - -	1 15 2	– – 7	– – 2	1 15 11	129 19 11	- - -	- - -	- - -	- - -	-
- - -	– 4 10	– 4 6	- - -	– 9 4	1,153 10 8	- - -	- - -	- - -	- - -	-
- - -	- - -	- - -	- - -	- - -	- - -	- - -	16 15 10	13 18 1	30 13 11	51
- - -	– 5 6	– – 1	- - -	– 5 7	20 13 1	- - -	- - -	- - -	- - -	-
- - -	- - -	- - -	- - -	- - -	- - -	- - -	22 10 –	18 12 8	41 2 8	69
- - -	– 9 4	– – 2	– – 1	– 9 7	34 18 10	- - -	- - -	- - -	- - -	-
– 6 7	5 17 3	– 3 –	- - -	6 6 10	866 19 7	- - -	39 7 10	32 12 7	72 – 5	121
– 10 2	8 19 10	– 4 7	- - -	9 14 7	1,331 5 3	- - -	60 9 9	50 1 11	110 11 8	18
- - -	- - -	- - -	- - -	- - -	- - -	- - -	18 6 –	15 3 2	33 9 2	5
– 8 4	– – 4	– – 4	- - -	– 9 –	684 13 10	- - -	- - -	- - -	- - -	-
- - -	- - -	- - -	- - -	- - -	- - -	- - -	17 12 9	14 12 2	32 4 11	5
- - -	- - -	- - -	- - -	- - -	- - -	- - -	9 4 10	7 13 2	16 18 –	2
– – 7	- - -	- - -	- - -	– – 7	45 17 7	- - -	- - -	- - -	- - -	-
- - -	- - -	- - -	- - -	- - -	- - -	- - -	14 11 7	12 1 6	26 13 1	4
– 16 –	– – 8	– – 8	- - -	– 19 4	1,479 11 5	- - -	- - -	- - -	- - -	-
- - -	- - -	- - -	- - -	- - -	- - -	- - -	5 6 9	4 8 3	9 15 –	1
1 2 5	– 8 6	– – 2	- - -	1 11 1	121 18 5	- - -	- - -	- - -	- - -	-
– 2 3	– – 1	– – 1	- - -	– 2 5	180 1 11	- - -	- - -	- - -	- - -	-
- - -	- - -	- - -	- - -	- - -	- - -	- - -	67 9 11	55 18 1	123 8 –	20
12 2 2	4 8 5	– 1 3	- - -	16 11 10	1,314 7 –	- - -	- - -	- - -	- - -	-
4 13 4	– 3 9	– 3 5	- - -	5 – 6	7,666 3 7	- - -	- - -	- - -	- - -	-
- - -	- - -	- - -	- - -	- - -	- - -	- - -	18 3 6	15 1 1	33 4 7	5
103 17 10	1,113 11 10	22 9 3	250 15 10	1,490 14 9	123,661 16 5	- - -	6,897 9 3	5,712 15 11	12,610 5 2	21,26

ACCO

SSETS AND LIABILITIES,
ON 25TH MARCH 1857.

PARISHES, DISTRICTS, AND PARTS.	CASH BALANCES,			ing to oard.	Debts owing by the Board.	
	In Debt.				Mortgage Loans and other Standing Liabilities.	Current Liabilities.
	£. s. d.	£. s. d.	£. s. d.	s. d.	£. s. d.	£. s. d.
Brought forward (from p. 66) - - -	- - -	- - -	4,546 11 10	17 8	413,274 14 -	18,652 8 3
ST OLAVE'S DISTRICT.						
St. Olave - - - - - - - - -	- - -	- - -	- - -	8 1	4,606 18 -	67 17 4
St. Thomas, Southwark - - - - - -	- - -	- - -	- - -	13 7	409 2 4	6 - 6
St. John, Horsleydown - - - - -	- - -	- - -	- - -	- -	3,767 18 5	55 10 3
Close of Collegiate Church of St. Peter - -	- - -	- - -	1 6 1	17 10	11 16 11	- - - -
The Charter House - - - - - - -	- - -	- - -	1 18 8	8 1	26 6 2	1 - 10
Inner Temple - - - - - - - -	- - -	- - -	24 5 8	1 9	220 11 1	- - - -
Middle Temple - - - - - - - -	- - -	- - -	15 19 8	19 -	145 3 4	- - - -
Lincoln's Inn - - - - - - - -	- - -	- - -	17 1 4	- 3	154 19 2	- - - -
Gray's Inn - - - - - - - -	- - -	- - -	14 18 9	2 5	239 14 1	6 17 8
Staple Inn - - - - - - - - -	- - -	- - -	2 4 3	6 -	20 2 -	- - - -
Furnival's Inn - - - - - - - -	- - -	- - -	4 8 6	12 1	40 4 -	- - - -
DISTIRCTS or PARTS Without the Limits of the Metropolis, as defined by the Act.						
Willesden:						
Counter's Creek - - - - - - -	- - -	- - -	- - -	14 -	245 6 6	35 5 8
Ranelagh - - - - - - - -	- - -	- - -	- - -	11 9	96 16 10	14 19 7
Ditto - Bayswater Sewer - - - -	- - -	- - -	- - -	-	- - - -	- - - -
Fulham, &c. - - - - - - - -	- - -	- - -	- - -	4 8	337 13 -	17 8 1
Acton—Fulham, &c. - - - - - - -	- - -	- - -	- - -	9 8	3,136 7 5	161 12 10
Ealing—Fulham, &c. - - - - - - -	- - -	- - -	- - -	- -	869 8 6	44 16 2
Extra-Parochial:						
Southampton Buildings, &c.—Holborn - - -	- - -	- - -	- - -	- 7	6 6 7	- 5 4
Lambeth Palace—Surrey and Kent - - -	- - -	- - -	- - -	17 10	139 7 2	1 2 4
Deptford Dockyard—Surrey and Kent - -	- - -	- - -	- - -	16 1	79 13 3	- 12 9
Borough Market Tolls—Surrey and Kent - -	- - -	- - -	- - -	14 4	31 17 -	- 5 1
Hornsey—Finsbury - - - - - - -	- - -	- - -	- - -	15 6	24 3 6	- 4 9
Chiswick—Fulham, &c. - - - - - - -	- - -	- - -	- - -	17 -	5,344 10 5	275 8 11
Wimbledon—Wandle - - - - - - -	- - -	- - -	50 12 7	1 9	- - - -	- - 1
Mitcham—Wandle - - - - - - -	- - -	- - -	145 15 11	8 3	- - - -	- - 3
Merton—Wandle - - - - - - - -	- - -	- - -	44 12 2	11 3	- - - -	- - 1
Wallington—Wandle - - - - - - -	- - -	- - -	7 19 9	15 3	- - - -	- - - -
Croydon—Surrey and Kent - - - - -	- - -	- - -	- - -	18 9	540 15 11	4 6 6
Morden—Wandle - - - - - - - -	- - -	- - -	27 18 10	15 1	- - - -	- - 1
Richmond—Richmond - - - - - - -	- - -	- - -	- - -	14 10	1,857 9 1	6 8 11
IMPROVEMENT RATES, &c. - - -	- - -	- - -	6,860 16 9	4 8	- - - -	- - - -
MAIN INTERCEPTING DRAINAGE - -	- - -	- - -	- - -	-	- - - -	- - - -
Total - - - £.	- - -	- - -	11,766 10 9	18 -	435,627 4 8	19,252 12 3

		AIN INTERCEPTING DRAINAGE.			GENERAL PURPOSES.	TOTAL RECEIPTS.
District Rates.	Improvement Rates, &c.		Investments.	Total.	Contributions, &c.	
			Sale of and Interest on Exchequer Bills.		Incidental Receipts.	
£. s. d.	£. s. d.	d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
41,865 15 –	- - -	5	4,541 17 7	8,349 4 –	15 19 2	53,328 11 7
325 12 3	- - - -	6	20 14 7	38 2 1	– 1 5	369 19 8
26 6 6	- - - -	10	1 16 10	3 7 8	– – 2	30 5 3
210 2 11	- - - -	3	16 19 –	31 3 3	– 1 2	246 4 11
- - - -	- - - -	3	– 8 8	– 15 11	- - - -	– 15 11
8 13 4	- - - -	4	– 15 11	1 9 3	– – 1	10 2 9
- - - -	- - - -	3	8 1 4	14 16 7	- - - -	14 16 7
- - - -	- - - -	–	5 6 3	9 15 3	- - - -	9 15 3
- - - -	- - - -	1	5 13 5	10 8 6	- - - -	10 8 6
53 – 4	- - - -	6	5 10 4	10 2 10	– – 5	63 4 2
- - - -	- - - -	4	– 14 8	1 7 –	- - - -	1 7 –
- - - -	- - - -	8	1 9 5	2 14 1	- - - -	2 14 1
3 2 11	- - - -	-	- - - -	- - - -	- - - -	3 2 11
44 16 9	- - - -	-	- - - -	- - - -	- - - -	44 16 11
– 10 11	- - - -	-	- - - -	- - - -	- - - -	– 10 11
3 – 3	- - - -	-	- - - -	- - - -	- - - -	3 – 3
27 15 –	- - - -	-	- - - -	- - - -	- - - -	27 15 3
8 3 10	- - - -	-	- - - -	- - - -	- - - -	8 3 11
4 16 8	- - - -	-	- - - -	- - - -	- - - -	4 16 8
3 – 7	- - - -	-	- - -	- - - -	- - - -	3 4 3
6 – 11	- - - -	-	- - - -	- - - -	- - - -	6 3 4
2 8 4	- - - -	-	- - - -	- - - -	- - - -	2 9 3
147 1 4	- - - -	-	- - - -	- - - -	- - - -	147 3 1
41 9 –	- - - -	-	- - -	- - - -	- - - -	41 9 5
2 16 1	- - - -	-	- - -	- - - -	- - - -	3 17 2
7 14 –	- - - -	-	- - - -	- - - -	- - - -	10 12 1
2 16 11	- - - -	-	- - - -	- - - -	- - - -	3 18 4
– 8 8	- - - -	-	- - - -	- - - -	- - - -	– 11 11
37 10 1	- - - -	-	- - - -	- - - -	- - - -	38 6 4
1 9 4	- - - -	-	- - - -	- - - -	- - - -	2 – 5
- - - -	- - - -	-	- - - -	- - - -	- - - -	43 4 3
- - - -	955 3 7	-	- - - -	- - - -	- - - -	955 3 7
- - - -	- - - -	-	140,000 – –	140,000 – –	- - - -	140,000 – –
42,834 11 11	955 3 7	5	144,609 8 –	148,473 6 5	16 2 5	195,438 15 11

Continued on page 72.

OARD OF WORKS.

O 25th MARCH 1857. -

INAGE. -

ESTABLISHMENT.							LOANS, &c.			
Collectors' Poundage, &c.	Rent, Taxes, &c.	Office Repairs, Furniture, &c.	Stationery, Printing, &c.	Instruments, Maps, Plans, &c.	Miscellaneous Expenses.	Total.	Loans paid off.	Interest on Loans.	Annuities.	Total.
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
1,814 9 2	252 9 7	126 11 11	441 13 5	181 9 3	267 1 8	3,441 13 6	9,000 - -	12,493 - 1	485 7 11	21,978 8 -
19 3 6	1 16 2	- 13 7	2 7 4	- 19 5	1 8 3	28 14 8	- - -	180 3 3	15 - 10	195 4 1
1 14 1	- 3 1	- 1 2	- 4 2	- 1 9	- 2 6	2 10 11	- - -	16 - 6	1 7 -	17 7 6
15 13 5	1 9 9	- 11 1	1 18 9	- 15 11	1 3 1	23 10 1	- - -	147 7 6	12 6 4	159 13 10
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- 17 6	- 1 -	- - 6	- 1 10	- - 9	- 1 1	1 4 2	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
2 - 1	- 6 8	- 3 7	- 12 7	- 5 2	- 7 6	4 3 9	- - -	2 8 7	- - -	2 8 7
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- 4 11	- 1 -	- - 6	- 1 10	- - 9	- 1 1	- 11 7	- - -	10 16 -	- - -	10 16 -
1 16 -	- 4 3	- 2 3	- 8 -	- 3 3	- 4 9	3 5 -	- - -	3 7 8	- - -	3 7 8
- - 11	- -	- -	- -	- -	- -	- - 11	- - -	- - -	- - -	- - -
- 6 6	- - 9	- - 5	- 1 6	- - 7	- 1 -	- 12 9	- - -	15 2 -	- - -	15 2 -
3 - 5	- 7 2	- 3 11	- 13 6	- 5 7	- 9 9	5 18 2	- - -	140 4 9	- - -	140 4 9
- 16 9	- 2 -	- 1 1	- 3 9	- 1 6	- 2 9	1 12 11	- - -	38 17 6	- - -	38 17 6
- 2 9	- - 6	- - 3	- - 11	- - 4	- - 6	- 5 10	- - -	- 3 5	- - -	- 3 5
- 13 3	- - 3	- - 1	- - 5	- - 2	- - 3	- 15 3	- - -	6 4 3	- 10 5	6 14 8
- 7 6	- - 7	- - 3	- - 11	- - 5	- - 7	- 11 2	- - -	3 11 4	- 5 8	3 17 -
- 3 2	- - 10	- 6	- 1 8	- - 8	- 1 -	- 9 -	- - -	1 8 5	- 2 8	1 11 1
4 12 9	- 5 1	- 2 9	- 9 8	- 4 -	- 5 9	6 7 5	- - -	- - -	- - -	- - -
5 2 10	- 12 3	- 6 7	1 3 1	- 9 6	- 16 7	10 1 5	- - -	238 19 5	- - -	238 19 5
- 13 4	- 2 6	- 1 4	- 4 8	- 1 11	- 7 10	2 - 1	- - -	- - -	- - -	- - -
1 18 7	- 7 2	- 3 10	- 13 7	- 5 7	1 2 5	5 15 10	- - -	- - -	- - -	- - -
- 11 9	- 2 2	- 1 2	- 4 2	- 1 9	- 6 11	1 15 5	- - -	- - -	- - -	- - -
- 2 2	- - 5	- - 3	- - 9	- - 4	- 1 2	- 6 6	- - -	- - -	- - -	- - -
2 11 6	- 3 9	- 1 10	- 6 4	- 2 7	- 3 9	3 16 1	- - -	24 2 11	2 - 3	26 3 2
- 7 5	- 1 5	- - 10	- 2 7	- 1 1	- 4 3	1 2 4	- - -	- - -	- - -	- - -
2 11 11	1 5 -	- 13 6	2 7 1	- 19 4	1 8 1	13 19 2	1,000 - -	109 16 2	- - -	1,109 16 2
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
- - -	- -	- -	- -	- -	- -	- - -	- - -	- - -	- - -	- - -
1,880 2 2	260 3 4	130 3 2	454 2 6	186 11 7	276 2 6	3,560 3 11	10,000 - -	13,431 13 9	517 1 1	23,948 14 10

- - - - - - -

- - - - - SEWERAG

Law and Parliamentary Expenses.	Retiring Allowances.	Tempor Allowan &c.
£. s. d.	£. s. d.	£. s
103 17 10	1,113 11 10	22 9
- 5 3	4 18 6	–
- - 6	- 8 8	–
- 4 4	3 16 8	–
- - -	- - -	- -
- - -	- 5 6	– –
- - -	- - -	- -
- - -	- - -	- -
- - -	- - -	- -
- - 2	2 7 8	– –
- - -	- - -	- -
- - -	- - -	- -
- - -	- 3 5	– –
- - -	- 17 11	– –
- - -	- - -	- -
- - -	- - 1	– –
- - -	- - 9	– –
- - -	- - 3	– –
- - -	- 3 4	– –
- - 2	- 3 3	– –
- - 1	- 1 10	– –
- - -	- - 8	- -
- - -	1 10 7	– –
- - -	- 1 3	- 1
- - -	- - 3	– –
- - -	- - 9	– –
- - -	- - 3	– –
- - -	- - -	- -
- - 8	- 12 7	– –
- - -	- - 2	– –
- - -	- 2 7	- 2
- - -	- - -	- -
- - -	- - -	- -
104 9 -	1,129 3 9	23 2

RPOSES.

CONTINGENCIES.					TOTAL.	TOTAL PAYMENTS.
Law and Parliamentary Expenses.	Retiring Allowances.	Temporary Allowances, &c.	Sums Refunded.	Total.		
£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
1,061 13 2	2,573 9 3	- - -	- - -	3,635 2 5	29,772 17 -	166,044 18 7
4 16 11	11 14 11	- - -	- - -	16 11 10	135 17 6	886 4 6
- 8 7	1 - 10	- - -	- - -	1 9 5	12 1 3	78 15 -
3 19 3	9 12 1	- - -	- - -	13 11 4	111 2 6	724 18 1
- - -	- - -	- - -	- - -	- - -	- - -	1 4 1
- 3 9	- 9 -	- - -	- - -	- 12 9	5 4 4	21 9 5
- - -	- - -	- - -	- - -	- - -	- - -	22 8 -
- - -	- - -	- - -	- - -	- - -	- - -	14 14 11
- - -	- - -	- - -	- - -	- - -	- - -	15 14 10
1 5 9	3 2 6	- - -	- - -	4 8 3	36 2 10	111 12 9
- - -	- - -	- - -	- - -	- - -	- - -	2 10
- - -	- - -	- - -	- - -	- - -	- - -	4 1 8
- - -	- - -	- - -	- - -	- - -	- - -	76 4 4
- - -	- - -	- - -	- - -	- - -	- - -	108 16 11
- - -	- - -	- - -	- - -	- - -	- - -	- - 11
- - -	- - -	- - -	- - -	- - -	- - -	93 12 3
- - -	- - -	- - -	- - -	- - -	- - -	869 9 -
- - -	- - -	- - -	- - -	- - -	- - -	241 - 4
- - -	- - -	- - -	- - -	- - -	- - -	4 4 1
- - -	- - -	- - -	- - -	- - -	- - -	19 13 2
- - -	- - -	- - -	- - -	- - -	- - -	11 7 5
- - -	- - -	- - -	- - -	- - -	- - -	4 15 7
- - -	- - -	- - -	- - -	- - -	- - -	67 12 2
- - -	- - -	- - -	- - -	- - -	- - -	1,481 11 6
- - -	- - -	- - -	- - -	- - -	- - -	58 8 3
- - -	- - -	- - -	- - -	- - -	- - -	168 4 5
- - -	- - -	- - -	- - -	- - -	- - -	51 9 5
- - -	- - -	- - -	- - -	- - -	- - -	9 4 5
- - -	- - -	- - -	- - -	- - -	- - -	77 3 -
- - -	- - -	- - -	- - -	- - -	- - -	32 5 -
- - -	- - -	- - -	- - -	- - -	- - -	2,604 11 5
- - -	- - -	- - -	- - -	- - -	- - -	458 5 -
- - -	- - -	- - -	- - -	- - -	—	—
1,072 7 5	2,599 8 7	- - -	- - -	3,671 16 -	30,073 5 5	174,366 1 3

(signed) *Wm. Andoe,*
Auditor.

METROPOLITAN BOARD OF WORKS.

REPORT

OF THE

METROPOLITAN BOARD OF WORKS.

(*Presented pursuant to Act* 18 *&* 19 *Vict., c.* 120, *s.* 201.)

Ordered, by The House of Commons, *to be Printed,*
3 *August* 1857.

[*Price* 1 *s.*]

234—Sess. 2.

Under 12 *oz.*

METROPOLITAN IMPROVEMENTS.

RETURN to an Order of the Honourable The House of Commons,
dated 25 June 1857;—*for*,

COPY "of **Report**, dated the 22nd day of June 1857, made to the **Treasury** by the **First Commissioner** of **Works**, in relation to the present State of the **Metropolitan Improvements** under the Direction of his Department; together with a **Copy** of the **Correspondence** referred to in that Report."

(*Sir Benjamin Hall.*)

Ordered, by The House of Commons, *to be Printed,*
26 *June* 1857.

130—Sess. 2.

COPY of REPORT, dated the 22nd day of June 1857, made to the TREASURY by the FIRST COMMISSIONER of WORKS, in relation to the present State of the METROPOLITAN IMPROVEMENTS under the Direction of his Department; together with a COPY of the CORRESPONDENCE referred to in that Report.

Sir *B. Hall* to the Lords of Her Majesty's Treasury.

My Lords, Office of Works, &c., 22 June 1857.

SOON after I was appointed First Commissioner, my attention was directed to the various improvements in the metropolis which were being carried out under the direction of this department, with a view to ascertain the progress that had been made, the money that had been expended upon each, and the sum required to complete them. The works to which I allude are,—

1. Battersea Park.
2. Chelsea Bridge.
3. Chelsea Embankment, and the Street from the New Bridge to Sloane Street.
4. The Pimlico Improvements.
5. The New Street from Spitalfields to Shoreditch.

The embankment and bridge are being executed under Mr. Page's direction, and the other works under the management and control of Mr. Pennethorne, who were originally appointed to undertake them.

On the 17th March 1856, I desired those gentlemen to report to me the history and progress of the various works at Battersea Park, Chelsea Bridge, Chelsea Embankment, and the New Street in connexion therewith; and statements were furnished by them which were subsequently presented to Parliament. (*See* Parliamentary Paper 193, Sess. 1856.)

Upon considering these reports, it appeared to me that a further and more extended investigation was necessary, not only with reference to the Chelsea Bridge and Embankment, but also to the improvements at Pimlico and Spitalfields. I therefore called upon Mr. Page and Mr. Pennethorne for further information; and I transmit herewith copies of the entire correspondence, so that your Lordships may know the amount of money expended up to the present time, and the amount still required to carry out the instructions of the Legislature, and complete the various works now in progress; and your Lordships will also see the excess upon the original, and, in some cases, the revised estimates.

I beg at the same time to submit the accompanying abstract of the correspondence, from which it will be observed,—

First. As respects Battersea Park. — That the sum of 69,909 *l.* 15 *s.* is required to complete the works comprised in the revised estimate of 1847; and when that amount is expended, the excess upon that estimate will amount to 111,065 *l.* 6 *s.* 11 *d.*

Second. As regards Chelsea Bridge.—That the sum of 34,503 *l.* 4 *s.* 10 *d.* is required to complete the works comprised in the revised estimate of 1852–53, and when that amount is expended, the excess upon that estimate will amount to 23,766 *l.* 2 *s.* 9 *d.*

Third. As regards Chelsea Embankment and the Street from the New Bridge to Sloane Street.—That the sum of 26,289 *l.* 8 *s.* 6 *d.* is required to complete the works to the west end of Chelsea Hospital, comprised in the revised estimate of 1852–53; and when that amount is expended, the excess upon that estimate will amount to 12,537 *l.* 0 *s.* 9 *d.*

Fourth. As regards the Pimlico Improvements. — That the sum of 27,810 *l.* 0 *s.* 5 *d.* is required to complete the works according to the Act of 1853; but until the completion of the improvements, the value of the Land and buildings to be transferred to the Commissioners of Land Revenue under the 7th section of the Act and the Treasury Minute of the 8th July 1853, cannot be ascertained. If, however, the value should fall short of 51,360 *l.*, the deficiency will have to be otherwise provided for.

Fifth. As regards the New Street from Spitalfields to Shoreditch.—That the sum of 12,000 *l.* is required to complete the works comprised in the revised estimates of 1850 and 1852; and when that amount is expended, the excess upon the revised estimates of 1850 and 1852 will amount to 20,467 *l.* 0 *s.* 1 *d.*

Before closing this letter, I must submit to your Lordships that all the above-named works were sanctioned by Parliament, and were commenced long antecedent to the period when I became First Commissioner; that since that period I have avoided giving any directions which should in any way, directly or indirectly, convey or imply a sanction to any departure from the previous estimates. My desire has been to wind up these affairs as speedily as possible; and the accompanying correspondence, to which I particularly invite your Lordships' attention, will exhibit some of the difficulties which I have had to encounter. I am quite sure that the best course will be to obtain a grant of money for the purpose of closing these matters; and that I should be instructed to realise, as speedily as possible, the value of the property which will remain at the disposal of this department after the completion of the works.

The property is considerable; it comprises about 125 acres at Battersea, outside the park; frontages at Spitalfields and Pimlico; and vacant land on the north approach to the bridge at Chelsea. In addition to these properties, there are contributions to be paid by parties having property near the embankment.

It is utterly impossible to give any accurate estimates of the amounts to be realised from the above sources, and which in some cases will not reach their full value until the adjacent improvements are completed.

The following is a summary of the sums required to complete these undertakings:—

	£.	s.	d.
1. Battersea Park - - - - - -	69,909	15	–
2. Chelsea Bridge - - - - - -	34,503	4	10
3. Chelsea Embankment and Street - -	26,289	8	6
4. Pimlico Improvements - - - -	27,810	–	5
5. New Street, Spitalfields - - - - -	12,000	–	–
TOTAL - - - £.	170,512	8	9

But whilst I am unable to state the exact amount that the properties proposed to be disposed of may realise, I am confident that the sum to be received will exceed 170,512 *l.* 8 *s.* 9 *d.*, and leave a very considerable surplus towards repaying the sum of 200,000 *l.*, advanced by the Exchequer Loan Commissioners for the formation of Battersea Park.

I should have sent this statement to your Lordships at an earlier period, but I waited for the award of Mr Norton, to whom the case as to the value of the proportion of land and buildings which have been added to Buckingham Palace was referred; this award, your Lordships will observe, was not sent in by Mr. Norton until the 19th instant.

I am, &c.
(signed) *B. Hall.*

The Right Hon. the
Lords Commissioners of Her Majesty's Treasury.

I.—BATTERSEA PARK.

QUESTIONS put to Mr. *Pennethorne* in Mr. *Austin*'s letter of 15th January 1857,	INFORMATION contained in Mr. *Pennethorne*'s Letters of 11th March and 8th April 1857, with reference to Mr. *Austin*'s Letters of 15th January and 28th March 1857.			
			£. s. d.	£. s. d.
1. What amount has been expended in the formation of the park, and all the works connected with it, up to the present time? This statement to include every expense of purchasing property, and other outgoings in relation to the undertaking.	1. The expenditure upon the whole undertaking from the commencement to the 28th February 1857 (including estimated liabilities to March 31st) - - - - -		315,999 2 10	
	The estimated liabilities are—	£. s. d.		
	Purchases - - - - -	1,816 – –		
	Works - - - 2,593 15 – Ditto - - - 600 – –	3,193 15 –		
	Expenses - - - - -	3,900 – –		
			8,909 15 –	
	Amount expended to 28th February 1857 - - -		- - -	307,089 7 10
2. The amount required from the present time to execute the works contemplated by the revised Estimate of 1847, setting forth, under different heads, the various works within the park; viz.:	2.	£. s. d.		
	Liabilities within the park - - -	7,093 15 –		
	Calvert - - - - - - -	150 – –		
The Embankment.	The embankment - - - - - -	35,000 – –		
Drives, walks, &c.	Drives, walks, &c. - - - - -	500 – –		
Surface drains.	Surface drains - - - - - -	—		
Planting.	Planting - - - - - - -	1,000 – –		
Fencing.	Fencing - - - - - - -	1,500 – –		
Levelling.	Levelling - - - - - - -	5,350 – –		
Lodges, &c.	Lodges, &c. - - - - - - -	5,000 – –		
Sewers (*see* outside the park).	Sewers - - - - - - - -	—		
			55,593 15 –	
		£. s. d.		
3. A similar account for works outside the park.	3. Liabilities - - - - - -	1,816 – –		
	Completing five main roads - - -	2,500 – –		
	Sewers (in estimate of 1847) - - -	5,000 – –		
			9,316 – –	
QUESTION put to Mr. *Pennethorne* in Mr. *Austin*'s Letter of 16th March 1857.	ANSWER.			
8. The probable cost of the enfranchisement.	8. Not less than - - - - - - - - - -		5,000 – –	
	Amount required to execute the Works contemplated by the revised Estimate of 1847 - - - - - - - - -		£.	69,909 15 –
			£.	376,999 2 10
	Amount of revised Estimate of 1847 - - - -			265,933 15 11
	Excess - - - -		£.	111,065 6 11

II.—CHELSEA BRIDGE.

Questions put by the First Commissioner of Works to Mr. *Page*, in Letter of 10 January 1857.	Information, in reply, contained in Mr. *Page's* Letter of 14 March 1857.	£.	s.	d.	£.	s.	d.	£.	s.	d.
1. What is the whole amount expended in relation to Chelsea Bridge?	1. Works paid under certificates - - -	50,243	2	5						
	Works under award, and plant - -	5,209	7	7						
	Engineer - - - £. 1,621 15 8 Superintendence, &c. - 1,713 1 8	3,334	17	4						
	Legal expenses - - - - - -	975	10	7						
	Total Amount Paid - - - - - -				59,762	17	11			
2. How much more will be required to complete the undertaking, including every charge that must be incurred, or has been incurred, in consequence of the works having been undertaken?	2. To be paid on account of works - -	30,747	10	–						
	Ditto - ditto - engineering -	1,505	14	10						
	Ditto - ditto - arbitration -	750	–	–						
	Total Amount to be Paid - - - - -				33,003	4	10			
	Add, for contingencies - - - - - - - - -				1,500	–	–			
	Total Cost of the Bridge - - - - - - - - - -							94,266	2	9
	Estimate 1852–53 - - - - - - - - - - -							70,500	–	–
	Excess upon the Bridge - - - £.							23,766	2	9

III.—CHELSEA EMBANKMENT, and the Street from the New Bridge to Sloane Street.

		£.	s.	d.	£.	s.	d.	£.	s.	d.
1. What is the whole amount expended in relation to Chelsea Embankment?	1. Payments on account of works - -	37,225	13	8						
	Ditto - under award - - - -	1,000	10	10						
	Ditto - extra foundations - - -	5,245	–	–						
	Ditto - in lieu of compensations - -	3,370	12	11						
	Ditto - railing and planting - - -	1,880	14	3						
	Ditto - engineering - £. 2,414 13 11 Ditto - superintendence 1,005 7 7	3,420	1	6						
	Ditto - miscellaneous charges - -	67	15	1						
	Ditto - proportion of arbitration - -	50	–	–						
					52,260	8	3			
	Ditto - on account of street purchases, &c. - - - - - -	35,657	3	6						
	Ditto - on account of street works -	589	4	9						
	Ditto - surveyors' charges, &c. - -	278	8	6						
	Ditto - legal expenses, rents, interest, &c. - - - - - -	4,448	6	–						
	Ditto - works on the Surrey side, &c. -	617	1	3						
					41,590	4	–			
	Total Amount Paid - - - - - - - -							93,850	12	3
2. How much more will be required to complete the undertaking, including every charge that must be incurred, or has been incurred, in consequence of the works having been undertaken?	2. Payments to be made:									
	On account of contracts, &c. - - - - - -				18,889	8	6			
	Ditto - additional railing - - - - -				600	–	–			
	Ditto - engineering, &c. - - - - -				1,600	–	–			
	Ditto - arbitration - - - - - -				200	–	–			
Question put to Mr. Pennethorne 7 May 1857. Whether there are any outstanding claims on account of the new street from Sloane-street to Chelsea Bridge; and if so, the nature and amounts of those claims?	So far as I (Mr. Pennethorne) can foresee, the total amount of claims now likely to arise upon this line of street will be				5,000	–	–			
								26,289	8	6
	Total Cost of the Embankment and the Street from the New Bridge to Sloane-street - - - - - - - £.							120,140	–	9
					£.	s.	d.			
	Estimate of 1852–53 - - - -				145,753	–	–			
	Omitted works west of Chelsea Hospital -				38,150	–	–			
								107,603	–	–
	Excess upon the Embankment to the west end of Chelsea Hospital - - - - £.							12,537	–	9

IV.—PIMLICO IMPROVEMENTS.

In Account with the Commissioners of Land Revenue.

	£.	s.	d.		£.	s.	d.
Value of land and buildings transferred from the Commissioners of Land Revenue to the Commissioners of Works (*see* Treasury Minute, 8th July 1853) -	78,260	–	–	Cash paid to Commissioners of Land Revenue, the proceeds of the sale of the site of the Duchy of Cornwall office - - - - - - - - -	4,300	–	–
				Value of land and buildings added to Buckingham Palace, according to Mr. Norton's award of the 19th June 1857 - - - - - - - -	22,600	–	–
				£.	26,900	–	–
				By value of land and buildings to be transferred to the Commissioners of Land Revenue - -	51,360	–	–
£.	78,260	–	–	£.	78,260	–	–

In Account with Value of Land and Buildings, Purchases, Works, &c.

	£.	s.	d.		£.	s.	d.
By value of land and buildings to be transferred to the Commissioners of Land Revenue, brought down - - - - - - - - - - -	51,360	–	–	Amount realised by the sale of property (Mr. Pennethorne's Letter of 27th March 1857) - - -	28,890	–	–
Amount expended to the present time in the purchase of property, works, &c. required for the improvements (Mr. Pennethorne's Letter of 27th March 1857) - - - - - - -	25,167	14	3	Balance - - - - - - - - - -	* 75,447	14	8
Amount required to complete the improvements according to the Act of 1853 (Mr. Pennethorne's Letter of 27th March 1857) - - - -	27,816	–	5				
£.	104,337	14	8	£.	104,337	14	8

* This amount includes the value of the land and buildings proposed to be transferred to the Commissioners of Land Revenue on the completion of the Improvements, calculated by Mr. Pennethorne (in his letter of 27th March 1857) at 41,707 *l.*

V.—METROPOLITAN IMPROVEMENTS—SPITALFIELDS EXTENSION.

New Street from Spitalfields to Shoreditch.

QUESTIONS in Mr. *Austin*'s Letter of 21st January 1857.	REPLIES in Mr. *Pennethorne*'s Letter of 19th May 1857.
	Expenditure.
1. A statement of the amounts of the different estimates of the cost of the undertaking, and the amounts to be realised, with the dates of these estimates submitted by you to the Office of Woods and Works, or to this office, and showing upon which of them the undertaking has proceeded.	1. First Estimate, 6th May 1847 - - - - £.160,457 5 5 Second Estimate, 27th May 1850 - - - 182,530 18 2 Third Estimate, 15th June 1852 - - - 27,700 – – Amounts to be realised (Returns), 6th May 1847 116,870 – – The undertaking was commenced upon Estimate No. 1 (160,457 *l.* 5 *s.* 5 *d.*), and is now being completed upon the Estimates, Nos. 2 and 3 (210,230 *l.* 18 *s.* 2 *d.*)
2. The entire expenditure of every description upon the undertaking to the present time.	2. £.218,697 18. 3. - - £. 218,697 18 3
3. The amount required from the present time to complete the undertaking, to be given under the following heads, viz.— 1. Purchases. 2. Works (in detail). 3. Contingencies. 4. Other Expenses.	£. s. d. 3. Purchases - - 6,000 – – Works - - 3,000 – – Contingencies - 3,000 – – Other Expenses - — 12,000 – – Total Cost - - - - - - 230,697 18 3 Estimates, 1850 and 1852 - - 210,230 18 2 EXCESS - - - £. 20,467 – 1
4. The value of the land applicable to building purposes when cleared of the existing houses and buildings.	4. Estimated total annual rent to be derived from ground - - £. 2,355.
5. The value of the existing house property (if any) vested in the Commissioners of Her Majesty's Works, &c. and not intended to be pulled down.	5. Estimated total annual rent to be derived from buildings - - £. 770.

CORRESPONDENCE ABOVE REFERRED TO.

I.—BATTERSEA PARK.

Battersea Park.

Sir,

Office of Works, &c., 15 January 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to inform you that he has gone carefully through your reports relating to Battersea Park, and that he cannot, from their contents, arrive at any satisfactory conclusion as to what will be the ultimate cost of that work.

It appears that the estimate submitted by you in June 1845, for forming the above park, amounted to 154,250 *l.*, and that it included,—

For the purchase of the land and the freeholders' interests, the sum of	£. 121,350
For public roads outside the park	10,000
For sewers (not built by the lessees)	3,000
For embanking the shore (without raising the ground, or bringing it out to a straight line)	5,000
For forming the park, viz., drives, walks, drains, planting, fencing, levelling, lodges, &c.	11,900
And for contingencies	3,000

Your report, containing this estimate, states, "that the probable return for "this expenditure (will be) 179,250 *l.*, making a balance in favour of the under- "taking of about 25,000 *l.*, of which, however, a large portion may be expected "to be absorbed by the cost of an embankment of the frontage of the park to "the River."

An Act (9 & 10 Vict. c. 38) was passed in 1846, authorizing the formation of the park; and soon after that Act was pssed, viz., in March 1847, a revised estimate was submitted by you, amounting to 265,933 *l.* 15 *s.* 11 *d.*, including, in addition to the works above enumerated, the sum of 66,083 *l.* 15 *s.* 11 *d.* for extending the purchases of freeholders' and leaseholders' interests; 25,000 *l.* for the embankment; 15,000 *l.* for expenses attending the whole undertaking; 2,000 *l.*, increased price for sewers; and 3,600 *l.* for increased estimates for forming the park. This estimate showed that there would be a balance in favour of the undertaking of 56,255 *l.* 4 *s.* 1 *d.*

The First Commissioner is now desirous of receiving information in as clear and concise a manner as possible upon the following points: he wishes to know—

1. What amount has been expended in the formation of the park, and all the works connected with it, up to the present time. This statement to include every expense of purchasing property, and other outgoings in relation to the undertaking.

2. The amount required from the present time to execute the works contemplated by the revised estimate of 1847, setting forth, under different heads, the various works within the park; viz.:

   The Embankment.
   Drives, Walks, &c.
   Surface Drains.
   Planting.
   Fencing.
   Levelling.
   Lodges, &c.
   Sewers.

3. A similar statement for works outside the park.

It will be seen by your revised estimate, that the land which was not included within the park was to reproduce the whole of the amount expended in relation

Battersea Park.

to the undertaking, and that a balance of 56,255 *l.* 4 *s.* 1 *d.* was to remain in hand.

The First Commissioner desires to know what steps have been taken towards realizing the alleged value of the property not inclosed in the park; and, further, the extent of sewage and drainage works which have been executed preparatory to the disposal of the building land.

The First Commissioner has given directions that you are to have access to all papers and documents in this Office that you may desire to inspect; and he is anxious to have the information required with as little delay as possible.

I am, &c.
(signed) *Alfred Austin*,
Secretary.

James Pennethorne, Esq.

Sir, 7, Whitehall-yard, 29 January 1857.

I HAVE the honour to acknowledge Mr. Austin's letter of the 15th instant, informing me that you had gone carefully through my reports relating to Battersea Park, and cannot, from their contents, arrive at any satisfactory conclusion as to what will be the ultimate cost of that work.

In that letter Mr. Austin sets forth the estimate made for the park in June 1845, and also the subsequent estimate of March 1847. As I shall hereafter have to report upon the cost of the undertaking, I will now only request you to allow me to observe, that the estimate (so called) of 1845 was only a general approximation, and contemplated the purchase of a much smaller site than that to which the subsequent estimate of 1847 referred, as fully set forth and explained in the report which accompanied that subsequent estimate. I would also observe, that interest upon borrowed monies was expressly excluded from that estimate, for which alone above 10,000 *l.* has been paid; also that the law and surveying charges, which have amounted to above 12,000 *l.*, have been, as I believe, greatly increased by the delay of the undertaking; and also, that the excess of about 43,000 *l.* upon the cost of the purchases over their estimated cost has arisen from the same cause; it was estimated, by the report which accompanied the estimate of 1847 (as it had before been in 1845), that the property was increasing annually in value, and would cost much more if the purchases should be delayed; and the estimates were based on the assumption that the purchases would be completed rapidly, there being, as was then supposed, funds available.

Within the last year the park has, as you are aware, proceeded rapidly; very large excavations were then being made for the London Docks, and a large sum was voted by Parliament; and these circumstances together enabled me to make arrangements for receiving the earth, whereby works have been done and are completed which last year I feared could only be accomplished in the course of years, if at all; the lake has been formed and filled with water, much of the low ground has been filled up, and the walks (which are nearly all completed) have been raised in every part to as high a level as the Parade in St. James's Park, or two feet only below Trinity datum; by these means the objections to the lowness of the site have been overcome in great part, if not altogether. Forty thousand trees have been planted, and within a short period the works will be so far advanced that I shall hope to be able to form a tolerably accurate opinion of the probable total expenditure, although of course the amount will depend upon your opinions and decisions as to what works may or may not be necessary.

The report which I had the honour to make to you in April last was accompanied by a detailed account of the total receipts and expenditure upon the undertaking up to the 31st March 1856, furnished to me by your accountant, Mr. Goodliffe, as many sums are received and paid without my knowledge; and if you will have the goodness to direct him to furnish me with a similar account made up to as late a period as can be permitted, I shall be enabled shortly afterwards to comply with your instructions.

I have, &c.
(signed) *James Pennethorne.*

The Right Hon. the
First Commissioner of Her Majesty's Works, &c.

Sir,

Battersea Park.

Sir, Office of Works, &c., 31 January 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c. to acknowledge the receipt of your letter of the 29th instant, respecting the cost of Battersea Park, and to send you the enclosed account (A.), made up to the latest period permitted by the books of this office, as requested by you.

I am further directed by the First Commissioner in regard to the following passage in your letter, " and within a short period the works will be so far " advanced that I shall hope to be able to form a tolerably accurate opinion of the " probable total expenditure, although of course the amount will depend upon " your opinions and decisions as to what works may or may not be necessary," and to refer you to my letter of the 15th instant, and to point out to you that the information therein required, as to the future expenditure in regard to the works within the park, and outside of it, respectively, relates to the amount required from the present time to execute the works contemplated by the revised estimate of 1847, under certain heads; and I am to add, that it appears to the First Commissioner that the statement can be made out forthwith. He therefore requests that this information, as well as the other information required by my letter above mentioned, may be rendered as soon as possible.

I am, &c.

James Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

(A.)

BATTERSEA PARK.

STATEMENT REFERRED TO.

RECEIPTS.

		£.	s.	d.	£.	s.	d.
	Total Received to 31st March 1856 - - - -				290,272	3	2
1856: From 1st April to 31st Jan. 1857.	Votes - - - - - -	21,262	–	–			
	Rents - - - - - - -	807	2	5			
					22,069	2	5
	TOTAL RECEIPTS to 31st January 1857 - £.				312,341	5	7

EXPENDITURE.

		£.	s.	d.	£.	s.	d.
	Total Expenditure to 31st March 1856 - -				281,068	8	6
1856: From 1st April to 31st Jan. 1857.	Purchases of property - -	1,155	11	–			
	Law charges - - - - -	38	17	10			
	Surveys, valuations, &c. - -	21	–	–			
	Ground-rents - - - - -	45	18	2			
	Expenses connected with formation of Park, labour, &c. - -	24,191	1	10			
	Miscellaneous payments - -	515	14	3			
					25,968	3	1
	TOTAL EXPENDITURE to 31st January 1857, £.				307,036	11	7

Battersea Park.

Sir, Office of Works, &c., 17 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your immediate attention to his letter of the 31st ultimo, transmitting to you an account, made up to that date, from the books of the Office, of the total receipt and expenditure in regard to Battersea Park, for the purpose of enabling you to furnish the information called for by the First Commissioner's letter of the 15th ultimo; and I am to request that you will furnish that information with as little further delay as possible.

I am, &c.

James Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Office of Works, &c., 26 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your attention to his letters of the 15th and 31st January last, and the 17th instant, in which certain information is required respecting the amount expended to the present time in the formation of Battersea Park, the amount required for its completion, and other matters in relation to that undertaking; and I am to request that you will immediately furnish him with a statement of the reason of your not having sent him the information asked for, the want of which extremely inconveniences him.

I am, &c.

James Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, 7, Whitehall-yard, 26 February 1857.

I HAVE the honour to acknowledge Mr. Austin's letter of this morning, respecting the expenditure incurred and to be incurred for the formation of Battersea Park, and requesting me to inform you of the reason of my not having yet sent you the information asked for. In reply, I beg leave to assure you that I regret extremely that I should have inconvenienced you. I thought, however, you were aware that I was anxious to postpone my report to the latest period you could permit; because every week, by bringing the ground-work within a more limited compass, has shown more clearly the works that can be completed this season, and has enabled me to form with greater accuracy the estimates for the works which will remain for completion after March. I have, however, been engaged upon these estimates, and expect to be able to report to you fully on the subject of the Park early next week.

I am, &c.

(signed) *James Pennethorne.*

The Right Hon. the
First Commissioner of Her Majesty's Works, &c.

Sir, 7, Whitehall-yard, 11 March 1857.

WITH reference to Mr. Austin's letter of the 15th January last, respecting the expenditure upon Battersea Park, incurred and to be incurred, to which I replied in part on the 29th January, and with reference also to my general report to you upon the subject, dated the 15th April 1856, and ordered by the House of Commons to be printed May 2d following, I have now the honour to report upon the works done and the expenditure incurred up to the present time; and to submit statements and estimates for those works which remain to be done to complete the park, and for other works, which I shall take the liberty to bring under your consideration, for raising the low ground near the south-east gate, for extending still further the walks on the raised level, and for forming additional mounds for plantations.

On the 31st March 1856, as shown by the general report of April 15, above referred to, considerable progress had been made towards raising the ground and preparing for gravelling the Victoria Road, the Albert Road, and the Prince of Wales' Road, which are the three principal public roads outside the park; but at the same time nothing had been done within the area of the park beyond

Battersea Park.

beyond bringing in earth for raising the Esplanade Road along the river bank, and for forming the footpaths and laying in the foundations of the carriage way of that road; since that date the works both outside and inside the park have progressed rapidly, especially the latter, as shown by the following statements:

Works done outside the Park since 31*st March* 1856.

The Victoria or Chelsea Bridge Road.—The filling in of earth to the height of 27 feet for the formation of the octagon at the foot of the bridge, forming the principal entrance to the park, has been completed; the gravelling of the footways and of the carriage way of all the road has also been completed; the fence on each side has been fixed, and for some months past the road has been fit for traffic, and has been subject to heavy cartage for the works of the bridge and of the park.

The Albert Road.—The south end of the Albert Road, for a length of 800 feet from the Lower Wandsworth Road to the park gate, has been gravelled; an iron culvert, three feet diameter, has been laid for the public sewer, where it crossed under the road; the foundation of the road throughout has been completed; a length of about 600 feet has been capped with broken Kentish rag, and the footways have been raised and made good; but the gravelling for a length of 2,300 feet, and the pipes and gratings for the drainage of about 1,700 feet, remain to be done.

The Prince of Wales' Road.—The western portion of the Prince of Wales' Road, for a length of about 700 feet from the Battersea Bridge Road up to the park gate, and one footway the whole length of the road, had been formed and gravelled in March 1856; since that time the whole of the other footway has been formed and gravelled, and the carriage-way has also been completed the whole length, except about 1,800 feet west of the Victoria Road.

The diagonal road from the south-west gate of the park towards Wandsworth, about 760 feet long, has been raised, formed and gravelled complete; and the foundation of the diagonal road from the south-east gate has been in part formed.

Works done within the Park since the 31st *March* 1856.

The works which have been done within the park since March 1856, may be shortly stated as follows; viz.

1. The carriage drive round the park, which is about two miles and a quarter long, has been formed and completed fit for use.

2. The walks in length, together about three miles, comprising all those most required, and an avenue 40 feet wide from tree to tree, and nearly half a mile long (the walk being 20 feet wide), have all been raised to an uniform level of only two feet below Trinity datum, or to as high a level as the parade in St. James's Park, and are all gravelled and fit for use.

3. The plantations, covering together an area of about 22 acres, have all been raised as mounds, varying from 3 feet to 10 feet above the original level of the ground, and have been planted with about 45,000 choice trees and shrubs.

4. The ornamental water, which covers an area of about 19 acres, has been excavated, embanked, and filled with water; the puddle bank around it being about a mile and a quarter long, exclusive of a dam next the sewer, 1,600 feet long.

5. The boundary fence on the east side of the park has been fixed, with also watch boxes to each of the five gates; and the park is now entirely enclosed, and perfectly secure from depredation or trespass.

In the report of 15th April 1856, an opinion was expressed that the park might be completed within 18 months from that time, "if the walks and plantations are to be formed upon the present level of the ground; but if the "walks are to be formed on a higher level, and mounds are to be raised for the "plantations (both of which are very desirable), it will be necessary to curtail "the annual outlay, and spread the work over some years." At that time there

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did not appear much probability that earth, to the great extent required, could be obtained rapidly for filling in the lower ground, and raising the levels of the drives, walks, and mounds; but, expecting to obtain some earth from the river, and from the excavation for the ornamental water, and being fully sensible of the very great advantage to be derived from rasing the levels, which I trusted might be accomplished within a few years, I proposed to complete within 12 months from that time, and on the raised levels, " the esplanade next the river, " the drive round the park, and all the plantations between the drive and the " boundary fence, with also two or three of the principal footpaths across the " park."

It is therefore with the greatest pleasure that I can now report that circumstances have enabled me to complete, within the past 11 months, the drives, and most of the walks and plantations upon the high level, so earnestly desired, and so essential for the park. The excavations for the London Docks were continued by Messrs. Cubitt, and, taking advantage of so unlooked-for an opportunity, the earth was secured for raising the levels rapidly, and was continued to be delivered there up to the 6th December, when apprehensions regarding the funds compelled me, with regret, to cease to receive it. Within that period, about 200,000 cubic yards of earth have been brought by the river (of which about 120,000 came from Messrs. Cubitt, and was conveyed from the river bank to the low ground, and mounds by means of the railway plant, purchased in 1855, for raising the Bridge road, assisted by a large plant which Messrs. Cubitt furnished without cost. This earth, with the addition of full 180,000 cubic yards more, excavated from the lake, from the gravel pits, and from the building ground within and around the park, together nearly 400,000, have enabled me to raise a large area, and in effect the whole area of the park, whereby the chief disadvantage of the site has been in great measure overcome.

The works have been carried out in conformity with the general principles upon which the plans of 1854 and of May 1856 were designed; but, during their progress, it became necessary to change the position of the water, on account chiefly of the subsoil, and the discovery of sand banks, &c. This alteration, together with the necessity for working the railways to advantage, occasioned considerable changes in the walks and plantations. The chief object of the design throughout has been to overcome the natural lowness of the site; for this purpose 19 acres of the lowest grounds have been covered with water, the top level of which will be only three feet below Trinity, or in many parts three feet above what the grass surface was before. About another 50 acres have been raised more or less, much of them three feet, and some mounds eight feet and ten feet above the original levels; and the plantations have been made very extensive, and treated more as ornamental gardens, than as open park scenery. Thus by bringing in earth, those portions which before were the higher grounds of the site, have become the lower; variety and undulation have been given to the surface; and the whole has been so divided, and the vistas have been so arranged, that when the plantations shall have grown, the comparative lowness of the site will pass unnoticed from the higher ground by the river side; and will not (as I believe) be objectionable even from the very high ground of the Chelsea Bridge-road, which has been raised near the bridge 27 feet above the original level.

Expenditure upon Works for the Formation of the Park.

The original estimate of the cost of forming the park, which I reported to the Commissioners of Woods and Works on the 22d March 1847, was 38,500*l.*, exclusive of the ornamental water, of the engineer's estimate of 25,000 *l.* for the embankment, and of the contingent expenses; viz.:

	£.	s.	d.	£.	s.	d.
For forming public roads outside the park - -	10,000	-	-	15,000	-	-
For building such lengths of sewer as will not be built by the lessees - - - - - - - - -	5,000	-	-			
For embanking the present shore, without raising the ground, or bringing out to a straight line - -	5,000	-	-	23,500	-	-
For drives, walks, drains, planting, levelling, boundary fences, lodges, and contingencies on the same -	18,500	-	-			
	£.			38,500	-	-

The

Battersea Park.

The above estimate was increased in my report of 15th April 1856 to about 53,267 *l.* 8*s* 7*d*, to cover the cost of forming the Bridge Road and the park embankment up to it, the ornamental water and the raising of the levels; the statement being as follows:

"The expenditure upon the works up to the 31st March last, including the "great embankment for the Bridge Road and the drive connected with it, has "been 25,267 *l.* 8*s.* 10*d.*, and the funds now applicable to works, including "25,000 *l.* remaining to be voted, are, I believe, near 30,000 *l.*

"The cost of the remaining works inside and outside of the park fence will "depend on what may be deemed essential, and upon the rate of carrying them "forward, both of which subjects require great consideration; but the 30,000 *l.* "will probably be sufficient, except for the river embankment, the cost of which "has been estimated by the engineer at 25,000 *l.*"

The sum voted in the Session of 1856 was only 21,262 *l.*; but when making the above statement, I had anticipated 25,000 *l.*, according to the sum printed in the Votes for the year 1853–54.

The expenditure upon works for the park and for the public roads outside, from the commencement to the 28th February 1857, has been as follows:—

		£.	s.	d.
Expenditure to the 31st March 1856, as before reported - -		23,267	8	10
Expenditure from the 31st March 1856 to the 28th February 1857:				
Cash paid for works - - - - - -	£. 24,919 14 –	27,513	9	–
Liabilities incurred for trees, shrubs, grass, seeds, road-making, &c. - - - -	2,593 15 –			
£.		50,780	17	10

The two preceding statements show an original estimate of 38,500 *l.*, augmented in April 1856 to about 53,267 *l.* 8*s.* 10*d.*, against an expenditure to the present time of 50,780 *l.* 17*s.* 10 *d.*; but the works, as estimated in 1847 for a park on the low level, differed so entirely from the works for the park on the higher level as contemplated in April 1856, and since executed (even much more rapidly than was then anticipated), that no just comparison can be made between these two estimates. The statements also show, that against the estimate of 30,000 *l.* in April last, there has been an expenditure (including liabilities incurred) of 27,513 *l.* 9*s.*, the former having supposed the works to be carried on progressively as earth could be procured from the building sites; and the latter being for the works as they have been executed rapidly, and at the cost of filling in the low grounds.

As the works are now brought near to a conclusion, and as this may be the last annual report I shall have occasion to make, I hope you will permit me, before quitting the subject of works, to bear testimony to the zeal of those who have had the conducting of them: the supervision of the whole has rested with my assistant, Mr. Arthur Cates, upon whom has devolved the onerous and responsible duties of daily attention, especially to the lake; of keeping all the accounts, of receiving the monies, and of paying all the workmen every Saturday.

Next to Mr. Cates, the whole has devolved on Mr. Farrow, the park superintendent, who is a most valuable and upright public servant, together with the control of the workmen (numbering throughout the winter 600), the direction of the contract work, of the road-making, of the gravelling, of the bringing in of the earth, of the railway, &c.

The levelling and planting have been done, at my request, entirely under the almost daily supervision of Mr. Gibson; he has travelled to all parts of England to procure trees and shrubs, and has shown great skill and judgment in the selection and planting of them, as well as in the formation of the ground, and I have been greatly obliged to you for allowing me his assistance, and to him for the manner in which it has been rendered.

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Expenditure upon the whole Undertaking.

The estimate of the expenditure upon the whole undertaking, as reported by me on the 22d March 1847, exclusive of interest on borrowed monies, &c., and of the engineer's estimate of 25,000*l.* for the river embankment, was as follows; viz.:

				£.	s.	d.
Purchases: Freeholders - - - -	£.143,724	18	–			
Leaseholders - - - -	43,708	17	11			
				187,433	15	11
Works - - - - - - - - - - - - -				38,500	–	–
Expenses attending the undertaking - - - - - -				15,000	–	–
£.				240,933	15	11

or a total of 265,933*l.* 15*s.* 11*d.*, with the embankment added.

The expenditure upon the whole undertaking, from the commencement to the 28th February 1857 (including estimated liabilities to 31st March), has been as follows; viz.:

	£.	s.	d.
Purchases (including 1,816 *l.* liabilities for Mrs. Arnold and others)	231,776	19	–
Works - (including 2,593 *l.* 15 *s.* liabilities as before stated, and 600 *l.* for works up to March 31st) - - -	51,380	17	10
Expenses (including 3,900 *l.* liabilities for rates, taxes, architect, Mr. Gibson, and other contingencies) - - -	32,841	6	–
£.	315,999	2	10

These two statements of general expenditure show, that up to the 31st instant, the excess of expenditure upon the whole undertaking over the original estimate of 1847 will be (including liabilities) 75,065 *l.* 6 *s.* 11 *d.*, viz.:

	£.	s.	d.	£.	s.	d.
Upon the Purchases - - - - - - -	44,343	3	1			
„ Works - - - - - - -	12,880	17	10			
„ Expenses - - - - - - -	17,841	6	–			
				75,065	6	11

The causes of excess have arisen entirely from circumstances which could not be provided for in the estimate, and over which I could not have had the slightest control; they have been fully explained on several occasions, and especially in the general report of April 15th, 1856.

The excess upon the purchases alone has been 44,343 *l.*, or about 25 per cent. on the estimate, and if they had been made within two years from the passing of the Act, as there was then reason to expect they would be, the estimates both for them and for the expenses would not have been exceeded; but the funds appropriated by the Act were not forthcoming; the Exchequer Bill Commissioners could only make their advances slowly, and in comparatively small sums; the whole of the properties were not acquired until eight years after the passing of the Act, during the whole of which time the lands were rising rapidly in value (as had been foretold), and businesses were established or increased which had little or no existence when the estimate was made; and the purchase of which became very expensive.

The excess upon the expenses has arisen also from the delays which occurred in making the purchases, and proceeding with the undertaking; these delays gave rise to the payment of interest on loans and purchases, which in 1847 had not been expected to arise, and was specially excluded from that estimate; for this alone, there has been paid a sum of 10,775 *l.* 18 *s.* 1 *d.*; for the law expenses also, which have been very considerably increased by the same delays, 8,837 *l.* 10 *s.* 6 *d.* has been paid. These two sums together, make

19,613 *l.*

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19,613 *l.* 8 *s.* 7 *d.*, for which, when the estimates were prepared, but a small provision was necessary.

The other incidental expenses for surveyors employed to value and give evidence before juries and arbitrators, for the costs of awards, for rates and taxes, &c., amount to 10,182 *l.* 7 *s.* 5 *d.*; this amount has, of course, been in like manner increased by the delays, but not to the same extent as the purchases, the interest, and the law expenses.

The expenses upon the works has exceeded the original estimate of March 1847 by 12,880 *l.* 17 *s.* 10 *d.* The works then contemplated are, however, as before stated, so totally different from those executed, that no comparison can be made between the two estimates; but the total expenditure on works up to the present time (including liabilities), which has been, as before stated, 51,380 *l.* 17 *s.* 10 *d.*, is below the sum of 53,267 *l.* 8 *s.* 10 *d.*, which I stated in my report of April 15th, 1856, would probably be sufficient (except for the river embankment), depending, however, on what might be deemed essential, and upon the rate of carrying on the works; it is also to be observed, that the expenditure of 51,380 *l.* 17 *s.* 10 *d.* includes the payment, during at least the last six months, of gatekeepers, constables, repairs of walks and roads, and other works usually comprised under the term of maintenance.

Works remaining to be done, or which are recommended.

The works remaining to be done to complete the park, or which might be undertaken for its further improvement, are as follows, the same being exclusive of the works to be provided for by the vote for maintenance for the year 1857-58:—

		£.	s.	d.	£.	s.	d.
	Outside the Park.						
	The completion of the Prince of Wales'-road, and the gravelling of the Albert-road and the Victoria-road, also forming and gravelling the road up to the south centre gate and the diagonal road to the south-east gate - - - -				2,500	–	–
	Inside the Park.						
Drives - -	Gravelling the loop road near the Albert Tavern -				150	–	–
Walks - -	Gravelling the broad walk south of the ornamental water, the two proposed diagonal walks for the esplanade, and other unfinished connecting walks - - - -	350	–	–			
	Building a culvert for the public sewer under the west drive - - -	150	–	–			
Levelling and forming ground.	Forming slopes along the edges of the south drive and the west drive	250	–	–			
	Forming ground along the south drive, the west drive, and towards the south-west gate - - - -	600	–	–			
					1,350	–	–
Planting - -	Trenching and planting to the extent of 12 acres, including purchase of trees - - - -				1,000	–	–
Filling up - -	Wheeling in slop, for one year - - - -				500	–	–
Raising the levels of walk, and of the low ground.	Bringing in earth, by railway, from the building ground, to raise the surface between the Victoria-road and east drive - - - - - -	1,000	–	–			
	Bringing in earth, by the river and railway, for the two diagonal walks, and for large mounds near them -	2,000	–	–			
	Bringing in earth for a large mound near the old shooting-ground, and slope for east drive - - -	1,000	–	–			
					4,000	–	–
	TOTAL - - - £.				9,500	–	–

Battersea Park.

Respecting the several works estimated, I beg leave to offer the following remarks:

The estimate for the completion of the public roads applies to those which are, in my opinion, required for letting the building lands, or which I should recommend the Commissioners to form themselves; it supposes them completed in a proper manner with surface drainage, fit for traffic, and in a state to be surrendered to the district, but nothing is included for a second coat of gravel (the sum of 600 *l.* having been provided for repairs in the estimate of the vote for maintenance), and there would not be a stone curb to the footpaths.

When the continuation of the Battersea Bridge-road was surrendered to the district board, they called for such a curb, but afterwards agreed to take to the road without it. There are not at present stone curbs to the other roads in the district: the cost of them might be from 2,000 *l.* to 3,000 *l.* or more, depending on the scantling and material, and it would be an expenditure which would not benefit the Commissioners, which I believe they are not bound to undertake by the Battersea Park Act, and which under any circumstances cannot reasonably be required from them.

The works within the park for completing the drive, the walks, the forming of the ground, and the plantations, and estimated to cost 1,350 *l.*, are perhaps not all of them essentially necessary, or they might be done progressively out of the votes for maintenance; but I have suggested them to be done within the next 12 months, as they are required for the completion of the design, and it would be an advantage to bring the park soon into good condition.

The estimate of 1,000 *l.* for planting is intended to include all plantations shown upon the Plan, except those few by the river side, which depend upon the construction of the river wall.

The estimate of 500 *l.* for wheeling in slop brought from the docks is submitted as an economical arrangement, particularly essential, and of the greatest service to the scenery of the park: the slop, when dry, becomes very fine earth. Probably not less than 40,000 cubic yards have already been brought, and applied to the formation of the long, gradual, and easy slopes from the esplanade road into the park; and the continuation of this process for at least another year I strongly recommend for completing the esplanade slopes, and more especially for the large central mound of the esplanade, which is calculated to produce great effect upon the scenery from every part of the park.

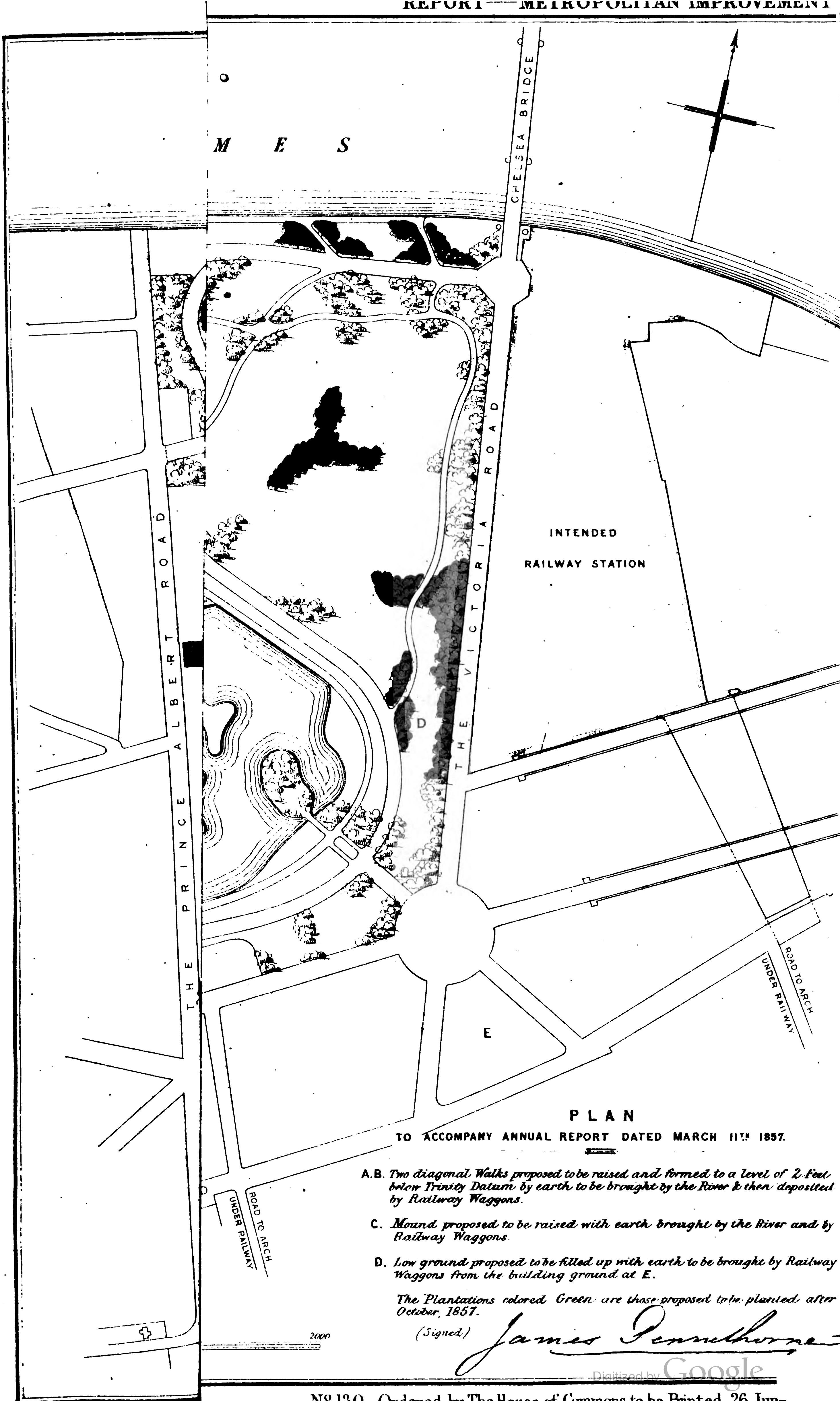
The last item of 4,000 *l.* is proposed for raising the levels of walks, for filling up the low grounds, and for forming additional mounds for plantations in the several situations, explained more particularly in the plan herewith transmitted.

One of the lowest portions of the lands purchased was around the junction of the two main sewers, or, now, near to the south-east gate of the park; this has occasioned great difficulties, but they have been in great measure overcome by converting one large portion into ornamental water, and by filling up another with earth brought in by railway, or excavated from the lake, which latter portion is now occupied by the east drive, with the avenue, and by the broad walk at the water side. But there still remains to be raised a considerable area of low ground between the east drive and the Victoria-road. In the course of years this, perhaps, might be done with rubbish and earth brought from the building ground and other places, but it forms so important and conspicuous a part of the park, that, in my opinion, the proposed outlay of 1,000 *l.* would be fully justified, and would be repaid by the immediate effect it would produce. If, however, it be done at all, it should be done in the present year (before the bridge is opened, and while the railway works are in progress), for the means I propose to adopt are a line of rails laid from the building ground, with waggons, &c., to bring from there the earth which the builders would eventually have to excavate for the basements of the houses.

The cost is stated to be estimated at 1,000 *l.*, and I believe it may be limited to that sum, but it would of course depend on the extent to which it might be deemed advisable to continue the filling up.

The cost of raising the ground along the lines of two diagonal walks yet remaining to be formed, including mounds for plantations connected with them, is set down in the estimate at 2,000 *l.*, depending, like the last, upon the extent to which the work may be carried. These walks are intended to lead direct from the river pier, and other central attractions, to the south-east and south-

west



PLAN

TO ACCOMPANY ANNUAL REPORT DATED MARCH 11TH 1857.

A.B. *Two diagonal Walks proposed to be raised and formed to a level of 2 Feet below Trinity Datum by earth to be brought by the River & then deposited by Railway Waggons.*

C. *Mound proposed to be raised with earth brought by the River and by Railway Waggons.*

D. *Low ground proposed to be filled up with earth to be brought by Railway Waggons from the building ground at E.*

The Plantations colored Green are those proposed to be planted after October, 1857.

(Signed) James Pennethorne

Battersea Park.

west gates of the park; they are essential to the park communications, and ought to be formed on the raised levels of the other walks; the mounds connected with them are proposed for large plantations, to curtail in each case the views over the lower land, to give variety to those portions, and to connect the plantations adjoining the river esplanade with the plantations in the interior of the park.

The raising a mound for a large plantation in the open space or low ground between the east drive and the embankment of the Victoria-road, estimated to cost 1,000*l.*, is proposed entirely as an addition to the scenery, and to break the long line of embankment which forms the Victoria-road; and, in my opinion, it is very desirable from almost every point of view, but especially so from the very high embankment which forms the approach to the park from Chelsea Bridge.

Respecting the two last subjects I beg leave to observe, that if these works should be done this season, I should expect to obtain much of the earth from Messrs. Cubitt's; but whether done this year or next, they must be done while the river bank remains in its present state, or not at all; the barges can now lay up close to the shore, on beds which have been expressly made for them; but after the river wall has been built, there will be no means of landing from them.

Hitherto the works of the park have been carried forward on the principle that, according to the levels and forms now adopted for the walks and plantations, so they must remain for the future; on this principle it was that the high levels were adopted, and the walks formed upon a healthy level, with good views, and with a varied and undulated scenery, instead of on the low level, which would have perpetuated all the evils of the site. By the adoption of the high level, the park has become agreeable and enjoyable; and it is submitted that, as the two items last referred to would only cost 3,000*l.*, the great principle on which the works have hitherto been carried forward ought not for that sum to be abandoned.

Works which are not at present required.

The works to which I have not yet alluded are the main sewers and branch roads for the lands outside the boundary fence, and the lodges and the river wall (with pier) for the park itself.

Outside the Park.

In the report of last year I stated that the public sewer or open ditch, which now traverses the whole length of the south side of the park, and cannot be filled up until the new main sewer has been constructed, is a public nuisance, and will, so long as it continues, be a great drawback and hindrance to the enjoyment of the park; the experience of the past year induces me to repeat this opinion even more strenuously. This sewer (independent of the nuisance and unsightliness) has created very great difficulties and expense, and is likely to interfere greatly with the letting of the building lands; nevertheless, I fear that no steps can be taken respecting it until the main drainage scheme for the south side of the river has been determined, and the works thereof have been commenced, or, at least, provided for.

According to the plans proposed by Mr. Bazalgette for the south side drainage, the large main sewer for Battersea would be carried under the whole length of the Prince of Wales' road; this, with a branch from it up the Albert-road, to intercept the present open ditch, would provide all the drainage required for the building lands, except the small sewers for the branch roads. There is probably little doubt but that this great sewer will be built (though four or five years hence), and as the cost would be defrayed by the rates, it has not appeared to me necessary to make provision for it in these estimates. Nor have I made provision for the smaller sewers under the branch roads, because the Metropolis Local Management Act (18 & 19 Vict. c. 120, s. 69) provides for all sewers to be built by the District Board, at their own expense, the cost to be afterwards recovered by them, wholly or in part, by an increased rate upon the properties improved; and as these smaller sewers could not be built until after the main sewer, and would not be required until the land has been let, their cost would fall upon the lessees, as was before contemplated.

Battersea Park.

When the new main sewer has been built, the present open ditch will, of course, be abandoned as a public sewer, and will require to be filled up, which would be a considerable expense; and I would take the liberty to submit to you, whether, in consideration of the sewers being a public work as well as the park, and of the advantage of both works to the parish of Battersea especially, it would not be reasonable to require the Metropolitan Board, when they build the new main sewer, to fill up the present open ditch with the earth to be excavated for the sewer, and also to form proper outlets for the surface drainage of the park and of the ornamental water.

The roads which have been formed, or the completion of which is included in the estimate herewith submitted, are all those which, in my opinion, would be necessary for the public, or for the letting of the building lands; and the more so as they will probably remain uncovered and almost unproductive for some years. I have, therefore, not made provision in the estimate for the cost of the branch roads; they will not be required until the lands are let for building purposes, and should then be constructed by the lessees.

Inside the Park.

The cost of building lodges at the four principal entrances of the park might be 4,000 *l.* or 5,000 *l.*, depending on the size deemed necessary; but I have not included any sum in the estimate, considering such an expenditure unnecessary for at least some years hence. Convenient iron huts, with fireplaces, have been erected at each of the gates, for the day and night watchmen and constables; the west lodge, which is now occupied by the head gatekeeper, and as offices for Mr. Farrow and Mr. Gibson, is a very convenient house, though its external appearance requires improvement. There are small houses in the neighbourhood which the gatekeepers are now permitted to occupy, and the house in which Mr. Farrow, the superintendent, now lives, is very suitable for his purposes. Victoria Park has remained now for above 10 years without lodges (except the house occupied by the superintendent); and as they are not essential for Battersea Park, and might possibly rather detract from than add to the scenery, I submit that the cost of building them may be postponed for some years.

The river wall or embankment was proposed, I believe, more for the improvement of the river than for the advantage of the park, but I have always considered it an integral part of the park; the esplanade (a leading feature of the park) would be formed almost entirely on land recovered from the river, and the omission of this part of the design would be greatly to be regretted. The construction of this embankment was contemplated in 1853, and was provided for in the estimate upon which application was made to Parliament for votes to complete the undertaking; but the monies so voted (which also, as I believe, included 50,000 *l.* for the outlay of the park) have been absorbed by the greatly-increased cost of the purchases, and no means now remain available for the embankment.

The cost of this embankment (estimated by Mr. Page at 25,000 *l.*) has not been included in my estimates, because the work belongs to Mr. Page; and though the scenery of the park very much depends upon it, and the work must appear unfinished till it is done, it is not advisable in my opinion to make application for funds for at least two years hence; because so long as the river shore remains in its present state, the barges can lie up to land earth and slop, and it is of much more importance to continue that supply for one year, if not for two, than to build the river wall.

Another subject hereafter to be considered will be the construction of a pier, which (as connected with the embankment) belongs to Mr. Page's department. The cost of this work has not, I believe, yet been included in any estimate, and the amount will depend upon the mode in which it may be built and the extent of river wall that may be included with it. The construction of a pier as a free access to the park would not benefit the public, but only the steam-boat companies, who would charge the same passage money whether this one pier be free or not; and therefore it should, I think, be built, and let to the companies for a rent (in the first instance) that would return a proper per-centage on the outlay, to be increased afterwards as the traffic will justify; or a frontage might be let to the companies on lease at a small rent for them to construct the pier. I apprehend, however, you will prefer the former course.

Battersea Park.

During the next 10 years many expenses must be incurred for the management and letting of the estate outside the park, of which no estimate can well be submitted; but these expenses it is presumed will be paid for out of the annual rent produced by the estate, which after the 25th instant will be about 3,000 *l.* per annum; and that amount will be augmented year by year, though the increase may not during the first few years be rapid.

Returns from Building Lands, &c.

The total quantity of land applicable to building purposes is 125 acres, and I believe it is correct to state that about 21¼ acres of the land (including the rights of landing attached to one pier) have been disposed of to the West London and Crystal Palace Railway Company in perpetuity, at a rent of 2,464 *l.* per annum, with power to them to purchase the same within six years, at the sum of 61,600 *l.* Of the land so let, a great portion is the least valuable of that which belongs to the Commissioners round the park, being very low, but part of it is good high ground, and the pier alone was estimated as worth 1,000 *l.* per annum.

At a general meeting of the company lately held, Sir S. M. Peto stated that "a very large plot of land near their intended station had since been purchased "at more than double the price the Company had paid for their land;" and though this might be explained by circumstances, it shows the Company are well satisfied with the terms accorded them.

Probably no correct inferences can be deduced from the above letting, but I think it justifies me in assuming that the total rental to be eventually derived from letting the whole 125 acres, will not be less than 10,000 *l.* per annum.

It would be difficult to hazard an opinion respecting the selling or letting value of the lands at the present time (and it would be improper to make it public); they would for the next few years be valued low, and I would recommend that no attempt be made for some time to let or sell, except some wharfs, houses, and outlying portions of land.

The Chelsea Bridge will not be open for traffic till towards the end of this year; the approach to the lands from Nine Elms will be interrupted for a yet longer period by the works of the railway; the locality cannot assume an aspect very different from that it now bears, nor become much known, until some time after those periods; the main sewer for the drainage of the lands may not be built for four or five years; and altogether I am of opinion that it would not be advisable to endeavour to let the lands by forcing them prematurely into the market, but that it would be advantageous to leave them to acquire increased value by the progressive improvement of the locality.

Having now, sir, according to your request, given explanations and details, and reported fully upon all subjects connected with the purchase and formation of Battersea Park, I take the liberty very respectfully to observe that the objects which the first promoters of the park had in view have now been accomplished. In 1843, when the Metropolitan Improvement Commissioners turned their attention to the subject as connected with the embankment of the river, to which their First Report referred, the lands known as Battersea Fields were a low marsh, intersected in every direction by broad black streams or ditches; the river shore was occupied by old timber docks, little better than receptacles for mud; and the river was only divided from the marsh by a narrow raised causeway. The marsh had been sold some few years before in many small allotments, at 50 *l.*, 60 *l.* or 70 *l.* an acre, and the several proprietors were about to commence building houses of the smallest description, considerably below the level of high-water, and without any possibility of drainage. It was chiefly for the purpose of preventing so great an evil as this, and to stop the objectionable purposes for which the locality was made available, that the Improvement Commissioners advised the purchase of the lands; and though circumstances have rendered the cost much more than was at first contemplated, and though the park will not be obtained and formed at a profit without cost, yet the cost will be comparatively small, and the recommendation of the Commissioners will have been fully justified by the result. The approach to the park by land will be good; the steamers on the river will bring people easily from all the dense parts of the City and of Southwark; the esplanade by the river side will be peculiarly attractive. The scenery will be diversified, assisted as it is by Chelsea Hospital, the Suspension Bridge, the Crystal Palace, the high grounds of Clapham, Wandsworth, &c.; and in a few years, after the plantations shall have grown, and the river embankment shall have been formed, there will probably not be a park near London presenting more attractions of scenery, or more sources for the enjoyment and recreation of the public than Battersea Park; and the locality altogether, instead of being (as would have been the case) a hot-bed of malaria, fever and crime, will be, as I firmly believe, a suburb worthy in every respect of the west end of London.

I have, &c.
(signed) *James Pennethorne.*

The Right Hon. Sir B. Hall, Bart.,
First Commissioner of Her Majesty's Works, &c.

Sir, Office of Works, &c., 16 March 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 11th instant, in reply to my letter to you of the 15th January last, respecting Battersea Park, and I have to request that you will furnish him with the following information;

1. The length (in feet) of the permanent embankment wall necessary for the park.

2. The price, per foot lineal, at which you estimate the embankment wall to cost complete.

3. Whether you have laid down any surface-drains, and if so, at what cost.

4. What extent of surface-drains remains to be laid down, and the cost thereof.

5. The estimated cost for fencing the plantations and walks, omitted to be stated in your letter, together with the length and nature of fencing required, with the cost per lineal yard.

6. The Plan accompanying your letter shows five cross roads; the cost of the formation of these cross roads, if not already completed, is requested.

7. What portions of the property remain to be enfranchised.

8. The probable cost of the enfranchisement.

I am, &c.
(signed) *Alfred Austin,*
Secretary.

James Pennethorne, Esq.

Sir, Office of Works, &c., 28 March 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your attention to my letter of the 16th instant, relating to Battersea Park, and to request that you will furnish him with the information required by that letter with as little further delay as possible.

I am, &c.
(signed) *Alfred Austin,*
Secretary.

James Pennethorne, Esq.

Sir, 7, Whitehall-yard, 8 April 1857.

REFERRING to the instructions contained in Mr. Austin's letter of the 16th ultimo, I transmit herewith drawings of plans, sections and elevations for the river wall in front of Battersea Park, which it was necessary to make to enable me to estimate the cost of that work; and, in reply to the several eight questions contained in Mr. Austin's said letter, I beg leave to state as follows:—

Questions 1 and 2.—The River Wall and Embankment:

ESTIMATE.	£.	s.	d.
The wall, built of brick, with stone coping and with concrete backing, as shown by the drawings - - - - - - - - -	25,000	–	–
The piling, for which only a provision can be made, say - - -	6,000	–	–
The filling-in, also as a provision, say - - - - - - -	4,000	–	–
TOTAL estimated Cost - - - £.	35,000	–	–

Some parts of this wall would be built close to the present shore, but others would extend into the river nearly to low water-mark, consequently the heights, thicknesses, and general strength of the wall will differ in the several parts; but the above estimate has been framed on the supposition that the coping would be level throughout at a height of 5 feet above Trinity datum, or 1 foot 6 inches higher than was proposed by Mr. Page in June 1845.

The drawing herewith submitted shows the wall at its extreme thickness and strength, as required for a height of 25 feet; and the estimate supposes that a length of 1,210 feet would be 17 feet high, that 2,200 feet would be 22 feet high, and that 400 feet would be 25 feet high.

The drawing also shows that it is proposed to disguise the appearance of a parapet, by forming a seat which would extend for about 1,500 feet in front of the esplanade, and would add greatly to the appearance of that part of the Park.

A sum of 6,000 *l.* has been set down in the estimate for piling; but the quantity that may be required will depend entirely upon the sub-soil, respecting which I am uninformed, and the sum stated may be too low.

A sum of 4,000 *l.* has also been set down in the estimate for filling-in the ground behind the wall; the total quantity required will be about 120,000 cubic yards, which, at 8 *d.*, would cost 4,000 *l.*; but the actual cost will depend upon the speed with which the work shall be carried on, and if it proceed rapidly, the estimate will be exceeded.

The total length of the river wall from the termination of the abutment wall of Chelsea Bridge to the west side of the Prince Albert-road, will be about 3,810 feet; and the total cost, according to the above estimate of 35,000 *l.*, would be, taking one part with another, an average of about 2 *l.* 4 *s.* per foot lineal above the estimate made by Mr. Page in 1845, arising chiefly, I presume, from the following causes:

1st. The increased length of 380 feet.

2d. The increased height of 1 foot 6 inches above Trinity datum.

3d. The increased quantity of stone work for the parapet.

As this work is in the hands of Mr. Page, I would respectfully submit the propriety of requesting his present opinion upon the subject, 12 years having elapsed since his estimate was made, during which period he has derived experience from the works he has already done, and has obtained information as to the foundation which may be expected for this portion of the wall, neither of which I possess.

Questions 3 and 4.—Surface drainage:

Surface drains have been laid down for the low clay lands, and for some walks, at a cost of about 200 *l.*; the outlet into the open public ditch or sewer being about 100 yards west of the west-end of the lake. A great part of the park lands is of a very absorbent nature, and the walks have all been formed high above the adjoining surface; both are therefore at all times dry, and it is not proposed to undertake any further surface-drainage.

The drainage of the low clay lands is the deepest that the present open ditch will permit; but possibly it may be deemed advisable to deepen and to extend this drainage, whenever, by the construction of the new sewer, such a work may become practicable.

Battersea Park.

Question 5.—Fencing Plantations :

The amount set down by me for wire and other fencing in my estimate for maintenance, dated 3d December 1856, was 1,500 *l.*

In the other parks the practice has been to inclose the plantations with wooden fences, to be superseded progressively by iron hurdles, and most of the plantations in Victoria Park are now fenced with wood; but, presuming you might deem it advisable to adopt immediately iron fencing for Battersea Park, I included the sum named in the estimate for maintenance, and apprehend it will cover all required within the coming year.

The total quantity necessary to inclose the plantations which have been completed is 10,000 yards lineal, which, at 3 *s.* a yard, would cost 1,500 *l.* As all the fence will require to be fixed on curved lines, and as the park will be grazed by sheep only, I believe light iron hurdles would be preferable to wire, and that they might be fixed sufficiently strong for the purpose at the price named.

Question 6.—The Cross Roads :

The two cross roads not formed are (as stated in the report of 11th March last) the road up to the south centre gate, and the diagonal road to the south-east gate; the cost of these two roads is included in the sum of 2,500 *l.*, set down in that report as the estimated cost of road-making outside the park.

Questions 7 and 8.—Enfranchisement :

The total quantity of the lands to be enfranchised will not be ascertained until the admissions have been completed; but I believe the surveyor to the lord of the manor expects it will not be less than 50 acres, and that the total cost of enfranchisement will not be less than 5,000 *l.*

I have, &c.
(signed) *James Pennethorne.*

The Right Hon. the
First Commissioner of Her Majesty's Works, &c.

Chelsea Bridge and Embankment.

II. & III. CHELSEA BRIDGE AND EMBANKMENT.

Sir, Office of Works, &c., 19 December 1856.

I AM directed by the First Commissioner of Her Majesty's Works, &c. to draw your attention to the following facts in relation to Chelsea Bridge and the Thames Embankment, both of which works were placed under your charge by his predecessors in this department, and to request that you will furnish the information required with as little delay as possible.

First, as regards Chelsea Bridge :

It appears that the estimate originally presented by you to the First Commissioner was 60,000 *l.*; this was subsequently increased to 70,500 *l.*, as appears by the Estimates of the year 1854. In the Vote then taken it is stated that "the estimated ultimate cost of the bridge, including contingencies of all kinds, "is 75,000 *l.*"

In the month of March last, the present First Commissioner desired you to prepare, and transmit to him full reports in regard to the bridge and the embankment, each of such reports to set forth the whole history of the case from the commencement, and what had been done in each year, and still remained to be done.

On the 21st of April you addressed a reply to him, which was presented to the House of Commons, and appears as Parliamentary Paper, No. 193, Session 1856, in which you inform him that the entire cost of the bridge will materially exceed the revised estimate you gave in 1853; but that, according to the words of your report, the entire cost of the bridge, including the approaches, would not exceed 88,000 *l.* You now inform him that the works, including the approaches, will not be completed for a less sum than 91,000 *l.*

In

Chelsea Bridge and Embankment.

In the same report you stated that the bridge would be open for the public traffic before the end of this year; and in the month of May last, at an interview you had with the First Commissioner on this subject, he made particular inquiry as to when the bridge would really be opened for traffic. You then assured him that it would most certainly be open before the end of the year; and in consequence of that assurance he stated in the House of Commons that the bridge would be open at the time you specified. He is now informed by you that it will not be opened till May, and he has also been told that it cannot be open before August. Such being the facts of the case, he desires to know,—

1st. Why the estimate of expenditure was increased from 70,500 *l.*, as stated by you to be sufficient in 1853, to 88,000 *l.*, as stated by you to be necessary in April 1856, and what were the items which would occasion the increased expenditure?

2d. Why, when you stated in April last that the works would be completed for 88,000 *l.*, you now consider it will be necessary to require 91,000 *l.*?

3d. By whose authority any extra works were undertaken?

4th. The reasons why you are unable to carry out the assurance you gave in April, and repeated subsequently, that the bridge would be open to the public before the end of the present year?

5th. When the bridge and approaches will really be open to the public?

6th. Will 91,000 *l.* really cover the whole expenditure, including contingencies of every description?

As regards Chelsea Embankment.

It appears that your original estimate for an embankment between Battersea and Vauxhall Bridges was - - - - - - - - - -	£. 77,000
Less the portion of embankment intended to be executed, and which was executed by Messrs. Cubitt - - - - - - -	14,779
Leaving for cost of the entire embankment from east to west (less Cubitt's portion as above) - - - - - - - - -	£. 62,221

On the 14th of February 1853, you added to this sum the large amount of 15,008 *l.* "for the increased price of materials, increased height of embank-"ment, roadway at the bridge, increased width, and six inches added to the "general level, and the substitution of iron for wood in the viaducts and "bridges," making an estimate of the total cost of the embankment from end to end of 77,229 *l.* But you added also the sum of 9,650 *l.* for an extension of the embankment from the west end of Cheyne Walk to Battersea Bridge, and consequent alterations of the line in front of the Cheyne Walk; thus making the total cost from end to end 86,879 *l.* According to the statements set forth in the account rendered in your last letter, dated the 16th instant, it appears that out of this sum of 86,879 *l.*, which was to cover the whole cost of the entire embankment from Vauxhall to Battersea Bridge, the sum of 38,150*l.* was to be expended upon that portion of the work which lies between the west end of Chelsea Hospital and Battersea Bridge; thus leaving a sum of 48,729*l.* as applicable to the eastern portion of the works which were to be executed between Messrs. Cubitt's on the east, and the western end of Chelsea Hospital on the west. No portion of the work contemplated between the west end of Chelsea Hospital and Battersea has been commenced. The First Commissioner, therefore, confines his inquiry to the eastern portion of the works now in progress, and for which, according to the last revised estimates of 1853, 48,729 *l.* was considered sufficient.

In the paper sent to this office yesterday, you say that 67,059 *l.* will now be required for the completion of the works, for which, in 1853, you considered 48,729 *l.* sufficient.

The

Chelsea Bridge and Embankment.

The First Commissioner desires you will inform him,—

1st. Why this excess of 18,330 *l.* over and above your revised estimate of 1853 will be required, and by whose authority any works beyond those authorised in the first instance by the First Commissioner were undertaken, if any have been undertaken, as neither in this case nor in the case of the Chelsea Bridge has the present First Commissioner authorised any departure from the original plan. And,

2d. What will really be the ultimate cost of this work between Messrs. Cubitt's and the western end of Chelsea Hospital, including all contingencies of every description.

3d. When the works will be fully completed.

You state in a *P.S.* to your letter of the 16th instant, that a revised estimate was made in this department for the Lords of the Treasury, which made up the total amount of the embankment to 92,579 *l.* If such an estimate was made, the particulars must have been furnished by yourself, and you will of course have access to any papers that you may require in this department for the purpose of affording the information now desired. It is perfectly true that Parliament has voted 92,579 *l.* for completing the works from Vauxhall Bridge to Battersea Bridge; but the First Commissioner desires at present to deal only with that portion of the line which lies between Messrs. Cubitt's on the east and the western end of Chelsea Hospital on the west, and it is to the works on this portion that he directs your attention, and on which he desires information.

I am, &c.
(signed) *Alfred Austin*, Secretary.

Thomas Page, Esq.

Sir, Whitehall Yard, 7 January 1857.

WITH reference to your letter of the 19th ult., conveying the observations and instructions of the First Commissioner of Her Majesty's Works relative to the estimate and expenditure on the Chelsea Bridge and Embankment, I have the honour to lay before you the following statement:

Of the Bridge.

On Question 1.—In answer to the question why the estimate of expenditure has increased from 70,500*l.* in 1853 to 88,000*l.* in 1856, and what were the items which would occasion the increased expenditure, I would observe, that the items causing the increased cost consist of the expenses consequent on the non-fulfilment of the contract of the first contractor; the increased prices paid to the succeeding contractors; the charges upon the works caused by the change of contractors, and by the consequent delay; the difficulties in the foundations on the Middlesex side, and the extra quantity of piling executed in both piers and land moorings consequent upon the nature of the ground; and the depth to which the piles were driven before meeting with the specified resistance.

	£.
Thus making the first contract for the piers at - - - -	8,465
The contract for the abutments at - - - - - -	9,135
And the contract for the iron work of the towers at - -	4,236
All of which were taken at fair prices at that date. The amount of the three would be - - - - -	12,837
Whereas, in consequence of the arbitration, the first contractor was paid upon these contracts - - - - -	19,405
The succeeding contractor for the abutments and other work was paid - - - - - - - - - - -	12,363
And the next contract for the towers was taken at - -	5,228
Making a Total of - - -	£.36,996

Causing,

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Causing, by reason of expense in foundations, increased prices, &c., an addition of - - - - - - -	£. 15,159
To which may be added the purchase of part of the first contractor's plant - - - - - - - - -	422
Making an excess of - - -	£. 15,581

Again, there was an increase in the price of ironwork between the time when the revised estimate was made, and the time for the contract of the girders, casing, &c. being taken, amounting to 25 per cent., which caused this contract to be based on prices higher in that proportion. The difference would amount upon the contract and upon the roadway plates prepared, say on an amount of 22,000 *l.*, to the sum of 4,400 *l.*, which, added to the 15,581 *l.*,

gives - - - - - - - - - - - - -	£. 19,981
And this, added to the amount of the estimate - -	70,500
Makes - - -	£. 90,481

The excess of the work over the estimate is thus very clearly accounted for, without taking account of the minor expenses consequent upon the delay.

On Question 2.—The difference between the 88,000 *l.* referred to in my report of April last, and 91,000 *l.*, arises from actual amounts having been ascertained, which at that time could only be estimated; from expenses incurred in extra fitting in the towers and mooring plates, and from an allowance made for covering the expenses connected with the completion.

On Question 3.—The works which may be called extra works, independent of the contract, are the lining of the river piers with brick work, as explained in my report of 18th of August last, and the bearers and roadway plates of the bridge, the former amounting to 1,494 *l.*, and the latter to 3,272 *l.*, both of which were absolutely necessary, and they are the only extra works for which I had not the authority of the Board; as the extra work upon the contracts, consisting of additional weights of iron work, of increased number and depth of piles, and of increased quantities of excavation, brick work, concrete, &c. rendered necessary by the state of the ground, are authorised under the terms of the contracts.

On Questions 4 and 5.—On the subject of opening the bridge to the public by the end of 1856, I certainly, in April last, had a confident anticipation that it would be completed by the end of the year, and I stated my opinion to that effect to the First Commissioner. A further delay, however, took place with the works of the towers, in consequence of my rejection of several defective castings, and of the work having to be chipped and filed on the spot. This delay induced me to give possession of the work to the present contractors, under an arrangement to finish any work left by the last; but the negotiations between the two parties as to transfer of plant unfortunately occupied an unexpected time, and this, with the extra fitting, has driven the work into the worst season of the year. They have now fixed their temporary chains, and have assured me of their completing their work during the month of May; and if this promise be fulfilled, although I may speak with diffidence after the last disappointment, I see no reason to prevent the bridge being opened in June.

With regard to the approaches, they are not under my control, nor did they form part of the estimate for the bridge, and I conclude that their being named in your letter in connexion with the estimate for the bridge has arisen from the misplacement, by the printer, of a note in my report of the 21st April last, where a comparison is given of the several metropolitan bridges, and in which the approaches are made to apply to Chelsea instead of to Vauxhall Bridge. As the Report was printed without my having seen a proof of it, I had no opportunity of correcting this and other clerical errors.

On Question 6.—With regard to the 91,000 *l.* covering the whole expenditure, including contingencies of every description, I estimate that the 91,000 *l.*

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will cover the expenditure on the actual works, the engineering charges, and superintendence; but it does not include any items for expenses on the arbitration beyond the amount awarded to the contractor, nor any amounts paid by the department beyond those which I have certified. The departmental accounts will show what any such sums are, and if referred to me, I will state what are properly chargeable to the bridge funds. The question has reference to contingencies of every description, but I am unable to answer for any contingencies beyond those actually appertaining to the execution of the works.

Of the Embankment.

Although, in my report of April last, I stated the particulars of the estimate and contributions as laid before Her Majesty's Commissioners for Metropolitan Improvements for the embankment and roadway, I may here briefly mention that the estimate for works in 1844 was 77,000 *l.*; that tenders for executing the same quantities of work were given by two contractors for 69,850 *l.* and 64,907 *l.* respectively, without allowance for contingencies; and that the late Mr. Thomas Cubitt expressed his willingness to execute the work for 75,425 *l.*

It may, therefore, be considered that the accuracy of my estimate at that date was sufficiently verified to induce the Royal Commissioners to recommend the work.

In the revised estimate at the commencement of 1853 an addition of 15,008 *l.*, as stated in your letter, was made for advance in the prices of materials, for increased height of roadway, for approaches from the embankment to the bridge, for enlarged width of carriage-way, and for the substitution of iron girders instead of timber in the bridges; and as provision was to be made for extending the embankment and roadway to Battersea Bridge, a further estimate was given for this extension, amounting to 6,650 *l.* These sums, added to the 77,000 *l.*, made an amount of 98,658 *l.*; and deducting the 14,779 *l.*; the estimate for the portion of the embankment to be executed by Mr. Cubitt, left 83,879 *l.* for the works between the west end of Mr. Cubitt's leasehold and Battersea Bridge.

When this revised estimate for the works was made, an important part of the embankment adjoining the Chelsea Bridge, and extending from the Grosvenor Canal entrance to the west end of Messrs. Thorne's premises, had been undertaken by a contractor on a scale of prices approved by the Board; but he was stopped in the execution of his contract by some impediments connected with the property of the Chelsea Waterworks Company, in front of which the embankment was to be formed.

These prices more than fully bore out the revised estimate; and if the entire work between Mr. Cubitt's leasehold and the west end of the Chelsea Hospital grounds had been contracted for according to these prices, the estimate would have been amply sufficient for the work.

But before the second and third contracts were undertaken, prices had considerably increased, and, compared with those at which the first contractor had executed work, the principal items stood in the following proportion:

		First Contract.	Second Contract.	Third Contract.
Timber piling - -	per cube foot	2*s*. 9*d*. & 3*s*. 3*d*.	5*s*. 6*d*. & 6*s*.	5*s*. 6*d*. & 6*s*.
Excavation - - -	per cube yard	8 *d*.	11 *d*. 1 *s*. 1 *d*. †	11 *d*.
Concrete - - -	ditto	4 *s*. 6 *d*.* 5 *s*. †	5 *s*. 9 *d*.* 6 *s*. 6 *d*. †	5 *s*. 6 *d*.* 6 *s*. 3 *d*. †
Brickwork - - -	ditto	17 *s*. 8 *d*.* 21 *s*. 2 *d*. †	22 *s*.* 24 *s*. †	22 *s*.* 26 *s*. 6 *d*. †
Filling - - -	ditto	11 ½ *d*.*	1 *s*. 4 *d*.*	1 *s*. 4 *d*.*
Granite - - -	per cube foot	2 *s*. 9 *d*.	4 *s*. 9 *d*.	4 *s*. 9 *d*.

* Above low water.

† Below low water.

From

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From this comparison it will be seen that the increase over the first contract prices was as follows:

Timber piling	50 per cent.
Excavation	50 per cent.
Concrete	33 per cent.
Brickwork	25 per cent.
Filling	33 per cent.
Granite	66 per cent.

I have calculated that had the work been executed at the first price, a saving would have been effected—

	£.	s.	d.
On the timber, piling, and shoes, of	2,913	–	–
On excavation	350	–	–
On pumping	1,278	–	–
On concrete	1,900	–	–
On brickwork	2,420	–	–
On filling	4,500	–	–
On granite	973	–	–
Making a Total of	£. 14,334	–	–

I have before stated, that in the revised estimate an allowance was made for raising the height of the embankment above the level first proposed; but when the first portion west of Mr. Cubitt's leasehold was contracted for, it was thought desirable by the department that the general level of the roadway should still more nearly approximate to the level required at the bridges over the dock entrances, where a prescribed headway had to be provided.

The increased cost of this additional height in concrete, brickwork, and filling, between Mr. Cubitt's leasehold and the west end of Chelsea Hospital, amounts to 3,213 *l.*

Again, along the first thousand feet west of Mr. Cubitt's, the roadway has been formed with a kerb and paved channel on each side, which were certainly not taken in my revised estimate, but which formed part of the contract for this part of the embankment. The length thus executed, and its continuation to the west end of Chelsea Hospital grounds, would cause an addition of 1,539 *l.* It is a great improvement on the roadway, but forms an extra on the estimate; and the further continuation of it may be dispensed with, if the Chief Commissioner shall so determine.

There is also provided in the estimate for the completion of the west end of Chelsea Hospital grounds, 1,200 feet of high railing for the slopes of the bridge approaches, which in the revised estimate was taken as a low railing; this, if carried out, would add 600 *l.* to the estimate.

Beyond the above causes of the increased cost of the work on which the revised estimate was based, I must refer to another source of expense, viz., the difficulties experienced in the foundations, owing to the prevalence of running sand, which not only rendered necessary an increased quantity of sheet piling along the line of river wall, but compelled me to construct the side walls of the Grosvenor Canal entrance on bearing-piles, and to form a continuous inverted arch under that entrance.

An allowance of 4,098 *l.* was made in the estimate for contingencies in the foundations, along that part of the embankment which has the greatest projection; but the actual work in piling and pumping alone has amounted to 4,748 *l.* more, besides extra concrete and brickwork in the Grosvenor Canal entrance, amounting to 497 *l.*

In my report of the 21st April last, I referred to the additional expense thrown on the embankment, by the arrangements to provide for the lessees of Lord Westminster and Mr. S. Stanley certain works in lieu of compensation, and which ought, of course, to be deducted from the general expense; these amount to 3,167 *l.*

It

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	£.	s.	d.
It therefore results, that, taking the amount caused by difference of prices, at	14,334	–	–
And the extra amount of piling, &c. in foundations	5,245	–	–
A Total of	£. 19,579	–	–

is obtained as an excess, which the circumstances of increased prices and extra works in foundations would have shown cause for, instead of the extra amount of 18,330*l.*

	£.	s.	d.
This sum of 18,330*l.* also includes the works done in lieu of compensation, amounting, as before stated, to	3,167	–	–
The sum for increased height of embankment, as before stated	3,213	–	–
The sum for extra kerb and channel for roadway, as before stated	1,539	–	–
The difference between the high railing and low railing on slopes	600	–	–
Making a Total of	£. 8,519	–	–

which, deducted from 18,330*l.*, leaves 9,811*l.* as the real excess over the estimate, instead of 19,579*l.*, the amount to justify which, causes have been shown.

With reference to the authority under which any works have been executed beyond those authorised in the first instance by the First Commissioner, I can only state that considerable delay occurred before any conclusive arrangements were made with those proprietors of frontages who agreed to contribute toward the expense of the work; and some changes were made in the docks, and in the appropriation of part of the land embanked, before the plan was signed by the representatives of the Board of Works, and by those of the several proprietors.

The works which have been executed, and those which are in course of execution, are strictly in accordance with the plan approved by all the parties: of which plan copies are appended to my report of April last.

The present First Commissioner has certainly, as stated in your letter, not authorised any departure from the approved plan.

On Question 2.—The ultimate cost of the work between Mr. Cubitt's leasehold and the western end of Chelsea Hospital grounds, including engineering and superintendence, I estimate at 70,960 *l.** I am unable to include all contingencies of every description, because there are doubtless charges upon the work beyond those under my control, but which the accounts of the department will contain.

On Question 3.—When this part of the work will be fully completed, I consider that the embankment and roadway to the west end of Chelsea Hospital can be completed by the end of May, but it is desirable to allow a longer period for the filling inside the roadway opposite the Chelsea Waterworks property, as a considerable quantity of materials for that purpose may thus be obtained at a reduced cost.

The difficulties in the foundations, and the necessity for providing during their execution for the existing traffic at the several docks and wharves have impeded the progress. I had also anticipated that the arrangements made by the Chelsea Waterworks Company, in the disposal of their property consequent on a change of site for their works, might have permitted the docks and bridge stipulated for by them to have been dispensed with; but, from communications with their representatives, I find that the dock will still form an important addition to their property.

I do not wish to enlarge upon the difficulties of the work, but it must be evident to the Chief Commissioner that the site of this part of the embankment, the great projection from high-water mark, the nature of the shore and substratum, have rendered it the most difficult and expensive portion of the whole line.

I may also submit, that in all cases when prices fluctuate, an estimate made for a work in one year cannot be expected to include contingencies for increase of prices during the succeeding years; and although it would have been advantageous

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* Including the 8,519*l.* previously explained.

Chelsea Bridge and Embankment.

tageous to the engineer to have made such a provision, it would not have been fair either to the Government or to Parliament to have estimated for prices beyond the current prices of the time.

I have, &c.
Alfred Austin, Esq. (signed) *Thos. Page.*

Sir, Office of Works, &c., 10 January 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 7th instant, which does not give the whole of the information required.

I am to acquaint you that the First Commissioner requests that you will, with the least possible delay, state, as precisely as you can, the exact amount that will be required to complete the whole of the undertaking, including contingencies of every sort. He cannot separate from the cost of the work the expenses attendant upon arbitrations, or the amount awarded, as these expenses would not have arisen if the bridge had not been undertaken; and, moreover, it is very probable that that, or any other similar expense, would not have occurred if proper precautions had been taken in the first instance, and if the works had been let out to one respectable contractor, instead of its being let out in parts.

The information now required as regards Chelsea Bridge is simply this:

1st. What is the whole amount expended in relation to Chelsea Bridge?

2d. How much more will be required to complete the undertaking, including every charge that must be incurred, or has been incurred, in consequence of the works having been undertaken?

The same information, under similar heads, is required in relation to the Chelsea Embankment; but you will confine yourself to that part which lies east of the west end of Chelsea Hospital grounds, which you originally estimated at 30,721 *l.*, and which estimate you subsequently, upon revision, increased to 45,729 *l.*

Directions are given that you shall have the fullest access to all documents in this office which may be useful to you in preparing the information desired, and which must be given in a plain and intelligible manner.

In your letter, you say that to put up an iron railing will cost an extra sum of 600 *l.* This sum you may add, but as a distinct and separate item, in case it should be ordered hereafter.

I am, &c.
(signed) *Alfred Austin*, Secretary.
Thomas Page, Esq.

Sir, Office of Works, &c., 21 January 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to refer you to my letter of the 10th instant, relating to Chelsea Bridge and Embankment, and to request that you will furnish him with the information therein required with as little delay as possible.

I am, &c.
Thomas Page, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Office of Works, &c., 17 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your immediate attention to his letters of the 10th and 21st ultimo, requesting information relating to Chelsea Bridge and Embankment, which was not sufficiently afforded by your letter of the 7th ultimo, in reply to his previous requisition on the subject; and I am again to express the desire of the First Commissioner to be furnished with that information with as little delay as possible.

I am

Chelsea Bridge and Embankment.

I am also directed to repeat the offer made in the letter of the 10th ultimo, that you should have the fullest access to all documents in this office, which might be useful to you in preparing the information desired.

I am, &c.
Thomas Page, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Office of Works, &c., 26 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your attention to his letters of the 10th and 21st January last and the 17th instant, in which certain information is required respecting the amount expended to the present time upon the new bridge at Chelsea, and the embankment of the River Thames, the amount required for their completion, and other matters in relation to those undertakings; and I am to request that you will immediately furnish him with a statement of the reason of your not having sent him the information asked for, the want of which extremely inconveniences him.

I am, &c.
Thomas Page, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Whitehall Yard, 3 March 1857.

WITH reference to your letters relative to the return of the amounts expended, and to be expended, in consequence of the works of the Chelsea Bridge and Embankment having been undertaken, I beg leave to state that, in order to carry out the First Commissioner's instructions in this matter, my assistants proceeded to extract from the books of the department the various payments which had been made out of the funds for the Chelsea Embankment and Bridge, in order that a proper division of the sums might be made under their several heads; but the absence of my principal assistant, who had been engaged with the former estimates, prevented the labours of the others being arranged until his return.

The First Commissioner's instructions, in your letter of the 10th ultimo, are so comprehensive, as to require a return of every charge which has been incurred or may be incurred in consequence of the works having been undertaken. This involved, not only the expenditure on works which belong to my department, but the expenditure in purchases, compensations, legal expenses, and various contingencies, of which I can know nothing but from your books.

In the statement to be laid before the First Commissioner, I must of course separate the charges for purchase, compensations, and legal proceedings, from the charges for the works themselves. I have therefore selected the following amounts relating to purchases, compensations, legal expenses, and miscellaneous items, which do not appear to me to have any reference to the divisions of the funds to which the works are charged.

Of these amounts, the sums for purchases and compensations, rent of premises, and rates, must belong to Mr. Pennethorne's portion of the estimate, and would be chargeable to that division of the fund; but of the law charges, amounting to 1,627 *l.* 10 *s.* 4 *d.*, as given in page 5 of the sheets attached to this letter,* and of the surveyor's charges, 253 *l.* 3 *s.* 6 *d.*, I am without the means of apportioning any part of either sum to the works, should any part of them be chargeable thereto, and I would ask the favour of your having such information given me as will enable me to conclude this part of the subject.

The sheet, No. 6,† contains a list of charges which do not belong to the Embankment Fund, part of which, viz. for the embankment on the Surrey side, I apprehend, would be chargeable to the Battersea Park fund, and of the charges against the King's Scholars' Pond sewer, and Mr. Brett's wall, I know of no fund to which they belong.

I should also require to know what further expense Mr. Pennethorne estimates will be incurred in purchases or compensations, before I can complete the statement for the First Commissioner.

I am, &c.
Alfred Austin, Esq. (signed) *Thomas Page.*

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* *See* page 33.

† *See* page 33.

THAMES EMBANKMENT.

Chelsea Bridge and Embankment.

DETAILS of ESTIMATE, February 1857.

	Purchase Money and Compensations.	*£.*	*s.*	*d.*	*£.*	*s.*	*d.*
1849, 1850 -	Purchase of property (as per Mr. Marshall's statement) - - -	6,000	–	–			
1853: Feb. 28	Purchase-money of Clarence House -	1,800	–	–			
1855: Feb. 6	Purchase-money for freehold property of the Chelsea Waterworks Company - - - - - - -	16,500	–	–			
– „ „	Lee, cost of award, Tuck's Wharf -	31	15	6			
– „ „	Grace & Co., compensation for inconvenience caused by the works -	65	–	–			
– April 13	Tuck's purchase-money for leasehold interest - - - - - -	1,788	–	–			
– April 24	Smith, purchase of interest in premises, Thames Bank - - - -	1,000	–	–			
– May 15	Taxed costs in the matter of Tuck's leasehold - - - - - -	210	15	6			
– June 22	Costs of award in the case of the White House - - - -	14	11	–			
– Aug. 1	Short-hand writer's account, reference in Tuck's case - - - -	12	19	–			
1856: Jan. 15	C. Gray and G. A. Gray, purchase-money for interest in houses, Nos. 8 and 9, Queen's Road - - -	315	–	–			
– Mar. 20	Hunt Gingell, compensation for giving up property, No. 8, Queen's-road, East - - - - - - -	100	–	–			
– „ „	Thomas Water, compensation for giving up property, No. 9, Queen's-road, East - - - - - - -	84	–	–			
– „ „	William Hewer, White Lion Stables, Chelsea - - - - -	35	–	–			
					27,957	1	–
– April 5	George Williams, purchase of leasehold interest in the houses 34½ and 35, Lower Sloane-street, Chelsea - -	200	–	–			
„ „	Caroline Holland, purchase of leasehold interest in the houses 34½ and 35, Lower Sloane-street, Chelsea -	484	2	6			
– „ „	Marshall, purchase of leasehold interest in the houses 34½ and 35, Lower Sloane-street, Chelsea - -	250	–	–			
April 11	Charlotte Vesey, compensation for surrendering possession of No. 15, White Lion-street, Chelsea - -	21	–	–			
– May 22	Ann Coton, purchase-money for the leasehold interest in premises required for Chelsea Bridge approaches - - - - - - -	750	–	–			
– June 21	Taylor, purchase of leasehold interest in Nos. 34½ and 35, Lower Sloane-street, Chelsea - - - -	500	–	–			
– July 26	Elliott and Watney, purchase-money for leasehold interest in White Ferry public-house - - - -	845	–	–			
– „ „	Elliott and Watney, for costs attending sale of property, and making out their title thereto - - - -	100	–	–			
– Nov. 25	Accountant-General, Court of Chancery, in behalf of Earl Cadogan, purchase-money for ground at Chelsea - - - - - - -	4,500	–	–			
					7,650	2	6

(*continued*)

Chelsea Bridge and Embankment.

THAMES EMBANKMENT.—Details of Estimate, February 1857—*continued.*

		£.	s.	d.	£.	s.	d.
	Rent of Premises.						
1850 - -	Ground rent of premises, Thames Bank	300	–	–			
– Aug. 15	Chelsea Waterworks, ground rent of Premises - - - - - -	75	–	–			
1853: July 31	Ground rent of premises, Thames Bank	300	–	–			
1854: April 1	Chelsea Waterworks, ground rent of premises - - - - - -	75	–	–			
– May 17	Chelsea Waterworks, ground rent, Thorne's malting establishment -	297	10	–			
1856: Aug. 8	Taylor, rent of Nos. 34½ and 35, Lower Sloane-street - - - - -	13	15	–			
– Oct. 24	Earl Cadogan, rent of stables, White Lion-street - - - - - -	44	–	–			
					1,105	5	–
	Rates and Taxes.						
1850, 1851 -	Rates and taxes (as per Mr. Marshall's statement) - - - - -	34	18	9			
1851: Nov. 24	Paving and lighting, rates and taxes, Thorne's premises - - -	3	5	4			
1852: Jan. 9	Ditto - - - ditto - -	3	5	4			
1853: Feb. 28	Sewer rate - - ditto - -	3	2	6			
– June 30	Ditto - - - ditto - -	6	5	–			
– July 31	Paving and lighting rates - - -	6	10	7			
1854: May 8	Paving and lighting rates - - -	5	4	2			
– Sept. 7	Sewer rate - - - - -	7	19	–			
1855: Jan. 26	Paving and lighting rate - - -	5	4	2			
– Nov. 21	Sewer rate - - - - -	–	17	–			
1856: May 23	Paving rate - - - - - -	4	18	7			
					81	10	5
					1,186	15	5
	Miscellaneous Services.						
1854: Dec. 8	J. and C. I'Anson, cleaning ground required for the new street, digging new graves - - - - - -	309	2	–			
1855: Sept. 19	J. and C. I'Anson, staking out new line of roadway - - - -	8	3	8			
1856: Jan. 1	J. and C. I'Anson, for embanking, fencing, &c. for approach to Chelsea Bridge - - - - - -	208	10	1			
– Feb. 5	J. and C. I'Anson, watchman - -	7	2	–			
– May 30	Ditto - - - - ditto - -	16	15	–			
– Aug. 28	Ditto - - for sinking trial pile -	2	1	–			
					551	13	9
1854: Dec. 8	G. Haines, for exhuming and burying bodies - - - - - -	-	-	-	37	11	–
1856: May 9	Reid, for keeping in order the plantation, Thames Bank - - -	-	-	-	10	–	–
1854: May 26	Osborne & Son, for trees and plants supplied to Thames Bank - -	45	11	6			
1855: May 25	Ditto - - - ditto - -	38	10	–			
1856: Feb. 1	Ditto - - - ditto - -	12	3	–			
					96	4	6
1854: May 26	Jackson & Son, for trees and shrubs supplied - - - - - -	-	-	-	34	5	–
	Interest on Loan.						
1848, 1849 -	Interest on loan of 20,000 *l.* - -	764	18	7			
1849, 1850 -	Ditto - - - - - - -	800	–	–			
1849, 1850 -	Interest on purchase of property -	61	18	5			
					1,626	17	–

Chelsea Bridge and Embankment.

THAMES EMBANKMENT.—Details of Estimate, February 1857—*continued.*

		£.	s.	d.	£.	s.	d.
	Miscellaneous Services.						
1847 to 1848 -	Law charges in connexion with loan -	31 6	10 3	– –			
1848 to 1849 -	- - - - - - - - -	1,439	4	10			
1849, 1850 -	Board's Solicitor's bill - - -	18	10	8			
	Other law expenses - - - -	20	–	–			
1850, 1851 -	Board's Solicitor's bill - - -	59	16	10	1,575	5	4
	Messrs. Pemberton, Crawley and Gardiner, bill in respect of Thames Embankment - - - - - -	-	-	-	52	5	
	Surveyor's Charges:						
	1847, 1848 - - - - - -	153	7	–			
	1848, 1849 - - - - - -	42	13	–			
	1849, 1850, Architect to Board -	27	17	6	225	17	6
1855: May 4	Mr. Shaw - - - - - -	13	13	–			
	Mr. Hunt - - - - - -	13	13	–	27	6	–
	Advertising Notices:						
1853: Mar. 31	Barker and White - - - -	24	14	–			
	Parliamentary Notices - - -	–	11	–	25	5	–
1853: Feb. 28	Purchase of fixtures, Clarence House	-	-	-	50	–	–
	Amounts supposed to be chargeable to Battersea Park Fund.						
	Works:						
1852: May 31	Earle, on account of embankment, Surrey side - - - - -	318	8	–			
1853: Jan. 31	Jackson - ditto - ditto - -	121	3	9			
1854: Aug. 23	Jackson - ditto - ditto - -	16	17	2	458	8	11
	Professional Services not chargeable to the Fund.						
1854: Dec. 23	Mr. Page, King's Scholars' Pond Sewer	100	–	–			
1856: July 9	Mr. Page, relative to Mr. Brett's premises - - - - - - -	60	12	6	160	12	6

Sir, Office of Works, &c., 5 March 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 3d instant, on the subject of the expenditure in respect of Chelsea Bridge and Embankment, and to acquaint you that he considers the information contained in your letter to be by no means clear.

The First Commissioner desired to have answers to certain questions, which questions were set forth most distinctly in my letter so far back as the 10th January. They were as follows:

1st. What is the whole amount expended in relation to Chelsea Bridge?

2d. How much more will be required to complete the undertaking, including every charge that must be incurred, or has been incurred, in consequence of the works having been undertaken?

The same information under similar heads is required in relation to the Chelsea Embankment.

He wishes you to give the answers in as clear a form as the questions are put. He has no objection to your placing under separate heads such amounts as you may consider ought to be so placed; but he must desire to know all the facts clearly, and he hopes that you will, without further delay, answer the questions put to you.

I am, &c.

Thomas Page, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Whitehall Yard, 6 March 1857.

With reference to your letter of yesterday's date on the subject of the Chelsea Bridge and Embankment, in which you state that the First Commissioner considers that "the information contained in my letter of the 3d instant "was by no means clear," I anticipate there must be some misapprehension on the subject of that letter.

The details given with it did not, and were not intended, to afford the information the First Commissioner has called for, but to point out the sums which had been paid out of the bridge and embankment fund, which do not appertain to the works, and some of which have no relation to the fund itself. I made a list of these last items, in order that they might be deducted from the list of payments charged against the fund.

My assistants have gone through the office books, and I am prepared to give a classification of the payments under their proper heads; but I cannot possibly give any estimate of what may have to be paid on account of purchases and compensations, and legal expenses, which estimate is really required to answer the questions of the First Commissioner. If you will obtain from Mr. Pennethorne the estimate for purchases and compensations yet to be made or completed, and from Mr. Gardiner an estimate of any legal charges, the information required by the First Commissioner can be completed.

I need scarcely observe, that those purchases, compensations, and legal expenses are matters totally unconnected with me, but I have been quite willing to arrange the information to meet the views of the First Commissioner, provided, in addition to the accounts in the department, I can have the estimates from the professional gentlemen under whose control they properly come.

I am, &c.

Alfred Austin, Esq. (signed) *Thomas Page.*

Sir, Office of Works, &c., 7 March 1857.

I am desired by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of yesterday's date, in which you anticipate there must be some misapprehension on the subject of your letter of the 3d instant.

You state, if I will obtain from Mr. Pennethorne the estimate for purchases and compensations yet to be made or completed, and from Mr. Gardiner an estimate of any legal charges, the information required by the First Commissioner can be completed.

You also state that you are prepared to give a classification of the payments under their proper heads, but that you cannot possibly give any estimate of what may have to be paid on account of purchases and compensations, and legal expenses. This being the case, you are requested to forward the information which the First Commissioner has called for, omitting what may be required on account of future purchases and compensations, and legal expenses; but the statement thus provided should specify with precision the items which you cannot supply.

I am, &c.

Thomas Page, Esq. (signed) *Alfred Austin*, Secretary.

Chelsea Bridge and Embankment.

Sir, Whitehall Yard, 14 March 1857.

With reference to your letter of the 7th instant, on the subjects of the payments for the Chelsea Bridge and Embankment, and on the First Commissioner receiving my statement of the amounts paid, without requiring me to furnish an estimated amount for purchases and compensations, and legal expenses, which may yet be required, I now beg leave to lay before you the following statement in answer to the First Commissioner.

The first question is, What is the whole amount expended in relation to the Chelsea Bridge?

The whole amount expended consists of the following sums:—

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180. Sess. 2.—METROPOLITAN IMPROVEMENTS.

It is requested that the accompanying Pages may be substituted for the corresponding ones, delivered on the 4th instant.

11 *July* 1857.

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would involve estimates for purchases and compensations, and for legal expenses, which, as stated in a previous report, are altogether out of my province; and therefore the amounts of the estimates given for charges incurred and to be incurred, both for the bridge and the embankment, apply only to works and superintendence, as follows:—

	£.	s.	d.
Payments to be made on account of works contracted for and estimated	30,747	10	–
Payments to be made on account of engineering and superintendence	1,505	14	10
Payments to be made for charges on the arbitration	750	–	–
Making a Total sum to be paid of £.	33,003	4	10
The cost of the bridge, for works, would therefore consist of these sums; viz.	50,243	2	5
	5,209	7	7
	30,747	10	–
Making a Total for works of	86,200	–	–
For engineering and superintendence	4,840	12	2
For law expenses and arbitration	1,725	10	7
Making a Total of £.	92,766	2	9

But as it is possible that circumstances might arise causing further charges, I would suggest that an additional sum of not less than 1,500 *l.* should be taken in the estimate for any such requirements.

Of

Chelsea Bridge and Embankment.

Of the Embankment.

The answers to the First Commissioner's questions, under the head of Embankment, will stand thus :—

No. 1. Works.

		£.	s.	d.
Payments made on account of works executed according to contracts -		37,225	13	8
Payments made for works under award of arbitrator - - -		1,000	10	10
Payments made for extra work in foundations - - - - - -		5,245	–	–
Payments made for works executed in lieu of compensation - -		3,370	12	11
TOTAL amount paid for works - - - £.		46,841	17	5
Payments made for railing and planting behind the wharves at Thames Bank - - - - - - - - - - - - -		1,880	14	3
	£. s. d.			
Payments made for engineering services - -	2,414 13 11			
For superintendence, and incidentals - - -	1,005 7 7			
		3,420	1	6
Miscellaneous charges - - - - - - - - - - -		67	15	1
Proportion of arbitration - - - - - - - - -		50	–	–
TOTAL Payments made for works of embankment, planting, engineering, superintendence and arbitration - - - £.		52,260	8	3

Purchases, Compensations, and Works of New Street.

No. 2. Purchases, Compensations, &c. New Street.

	£.	s.	d.
Payments made for compensations and purchases - - - -	35,657	3	6
Payments made for works connected with the new street - - -	589	4	9
Payments made for surveyor's charges and advertising - - -	278	8	6
TOTAL Payments made for purchases, compensations and works of new street - - - - - - £.	36,524	16	9

PAYMENTS which do not appear to have been provided for in any Estimate.

	£.	s.	d.
Payments made for legal expenses - - - - - - - -	1,634	13	7
Payments made for rents, rates, and taxes - - - - - -	1,186	15	5
Payments made for interest on loan - - - - - - -	1,626	17	–
£.	4,448	6	–

PAYMENTS for Services not belonging to the Chelsea Embankment, but which have been charged to that Fund, viz. :

For WORKS on EMBANKMENT on Battersea Side and Professional Services.

			£.	s.	d.	
1852:	May 31st.	Mr. Earle -	318	8	–	Surrey Embankment.
„	„	Mr. Jackson,	138	–	9	ditto - - ditto.
„	„	Mr. Page -	100	–	–	relative to King's Scholars' Pond Sewer.
„	„	Ditto -	60	12	6	relative to Mr. Brett's premises.
		£.	617	1	3	

	£.	s.	d.
Payments to be made on account of works contracted for, and estimated, including 200 *l.* for planting - - - - - - -	18,889	8	6
Payment for additional high railing - - - - - - -	600	–	–
Payments to be made on account of engineering and superintendence	1,600	–	–
Payment to be made in charges incurred by arbitration - - -	200	–	–
£.	21,289	8	6

I anticipate

Chelsea Bridge and Embankment.

I anticipate that all the information required by the First Commissioner is given in the above statement, excepting the estimated cost of purchases, compensations, and legal expenses; but I would suggest that it would be desirable for the accountants of the department to compare the amounts with the details of the books to prevent any inaccuracy, and to correct any entry of charges against the fund which do not properly belong to it.

I have, &c.
Alfred Austin, Esq. (signed) *Thomas Page.*

Sir, Office of Works, &c., 7 May 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to request that you will inform him whether there are any outstanding claims on account of the new street from Sloane-street to Chelsea Bridge; and, if so, the nature and amounts of those claims.

I am, &c.
(signed) *Alfred Austin,* Secretary.
James Pennethorne, Esq.

Sir, Office of Works, &c., 19 May 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to refer you to my letter of the 7th instant, respecting the new street from Sloane-street to Chelsea Bridge, and to request that you will furnish him with the necessary information therein asked for as soon as possible.

I am, &c.
(signed) *Alfred Austin,* Secretary.
James Pennethorne, Esq.

Sir, 7 Whitehall Yard, 23 May 1857.

I HAVE the honour to acknowledge Mr. Austin's letter of the 7th instant, inquiring whether there are any outstanding claims on account of the new street from Sloane-street to Chelsea Bridge; and in reply thereto I have to state, that the claims upon contracts for roadmaking now in progress will be about 3,500 *l.*, and that there will be other claims for fencing, &c., and for my own professional services.

So far as I can foresee the total amount of claims now likely to arise upon this line of street (including the above sums), will be about 5,000 *l.*, presuming that the Commissioners of Works will not be required by the local authorities to incur any further expenditure upon the road than has been contracted for, and that they will not undertake any works upon the ground west of the road.

I have, &c.
Alfred Austin, Esq. (signed) *James Pennethorne.*

Pimlico Improvements.

IV. PIMLICO IMPROVEMENTS.

Sir, Office of Works, &c., 21 January 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c. to inform you that he is not able, from the information contained in your reports upon the subject of the Pimlico Improvements, to ascertain what will be their ultimate cost, and that he is desirous of being provided with information upon the following points :

1. The amounts of the different estimates prepared by you from time to time of the cost of these improvements, and the amounts estimated by you as produce from the contemplated sales of property, with the date of each of those estimates.

2. The amount expended upon the entire undertaking up to the present time.

3. The amount required from the present time to complete the undertaking, according to the Act of 1853, under the following heads, viz.:

   1. Purchases.
   2. Works (in detail).
   3. Contingencies.
   4. Other Expenses.

4. The amount realised by the property derived from the land revenue already sold, exclusive of that added to Buckingham Palace; the estimated value of the residue of the property derived from the same source, not required for the improvements.

5. The same information as to property obtained from other sources.

6. The estimated value of the building land after the improvements shall have been completed, according to the Act of 1853; and the steps which have been taken for letting such portion of the land as is now available for building purposes.

I am, &c.

James Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, 7, Whitehall Yard, 27 March 1857.

PURSUANT to your instructions, I have prepared and annex hereto statements in reply to the several questions contained in Mr. Austin's letter of the 21st January last, respecting the Pimlico Improvements. I have arranged these statements, as nearly as I have the means of doing so, in the order and under the heads of the questions, and annex a summary of them in that order.

The chronological statement and the two estimates annexed to my report of the 2d of June 1855, with also the subsequent report and estimate of 12th March 1856, contained, I believe, a full account of all the then past proceedings, and of the then future prospects of these improvements; but a recapitulation of them will be explanatory of the statements hereto annexed.

I. The Franklyn and the Manby estates at Pimlico were purchased in the year 1840, " for the purposes of effecting the contemplated improvements in " the neighbourhood of Buckingham Palace and St. James's Park, in connexion " with the access along the Birdcage-walk and Great George-street to the Houses " of Parliament and courts of law," as stated in the 18th Annual Report of the Commissioners of Her Majesty's Woods, dated 1841.

In the year 1843 the White Horse Tavern, opposite to the south entrance of Buckingham Palace, was pulled down; and towards the end of 1851 all the other houses in Stafford-row and Princes-court had been pulled down for the purpose of obtaining a site for the proposed new wing of Buckingham Palace, and of improving the public thoroughfare. The public sewer was also diverted into the line of the then proposed new street, the gas and water mains were removed, &c., and the building of the south wing was commenced. No Act of Parliament was required for these works, and the value of the houses pulled down was about 17,500 *l.*

II. The Board of Woods and Works having been divided into two distinct Boards in October 1851, it became necessary to apply to Parliament for powers for the Board of Works to dispose of the Pimlico Estates for the purposes of the improvement, and a Bill to that effect was introduced, and received the Royal Assent on the 30th June 1852.

On the 28th May 1852, while the Bill was in progress, a Return was made to Parliament, showing that the estimated sum required for the improvement was 30,000 *l.*

The value of the whole property, as it then stood, south of the proposed new street, was estimated at 30,000 *l.*; and Mr. Gore was informed that the ultimate value of the building frontages to be returned to the Land Revenues was estimated also at 30,000 *l.*; and, according to the views of the Board of Works, the loss to those revenues would have been about 17,500 *l.*, the estimated value of the houses which had been pulled down before October 1851, but to these views Mr. Gore was not a party.

III. In 1853 Mr. Elliot entered into engagements for the purchase of properties, the completion of which would have secured to the Commissioners of Works a sum of 38,000 *l.* for the whole, instead of 30,000 *l.*, as before anticipated; they therefore determined to make the street further south, so as to be more direct, and to extend the improvement further westward, at a cost expected not to exceed 38,000 *l.*; so that the ultimate result to the Land Revenues might remain as anticipated in May 1852; and a Bill was introduced into Parliament to enable them to effect the improvement as so extended. During the progress of the Bill, *i. e.*, on the 5th July 1853, an agreement was entered into between the First Commissioner of Works and Mr. Gore, according to which, the value of the Land Revenue properties at the commencement of the improvement was to be taken at 78,260 *l.*, and their claim to compensation afterwards was to be taken to be the difference between that amount and the value of the property re-transferred, after deducting the proportionate value of the land and buildings added to Buckingham Palace.

IV. After the passing of the Act of 1853, the Commissioners of Works formed part of the new street on the more direct line; they sold ground on that line to the Duchy of Cornwall, and they issued notices to the several owners and occupiers of houses to make their claims; but, unfortunately, in December Mr. Elliot found himself unable to complete his purchases, and the Commissioners were obliged to release him from his engagements, whereby the funds for the improvement were reduced 8,000 *l.*; also, in July 1854, the jury summoned to assess the value of the Tomlinson Estate, gave a verdict 5,500 *l.* above the estimates of the six surveyors employed by the Commissioners, by which two events the funds were deranged to the extent of 13,500 *l.*, and a greatly increased value was given to the properties remaining to be purchased.

In consequence of these circumstances, the improvement was brought almost to a stand, and fresh estimates were prepared, more particularly those annexed to my report presented by you to the House of Commons, and printed 9th May 1856, which gave a statement of the transactions to that date, and showed that the sum then estimated to be required for the completion of the undertaking (subject, however, to the necessary uncertainty of such estimates) was 27,000 *l.*

V. According to the estimate which I have now prepared and annex hereto, the sum required will be 27,810 *l.*, subject to the usual reservation, which applies particularly to the present case; in this estimate the sum of 3,000 *l.* set down for contingencies, ought to suffice; but it may be exceeded if there should be any expensive jury or arbitration cases; and the sum set down for the purchases, 18,200 *l.* (which is the same as in the estimate of 1856, less the properties since

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since acquired), can only be considered as an approximation, according to the best of my judgment; for a great part of those purchases will involve goodwills for businesses, of the extent of which I am quite uninformed, which businesses are every year acquiring a longer standing, and by the improvement of the thoroughfare, and the opening of a road through the Park, may be every year increasing.

VI. The ultimate value of the building frontages and houses to be returned to the Land Revenues (inclusive of 4,300 *l.* already paid to them by the Duchy of Cornwall, but exclusive of the ground at the corner of Arabella Row, and the ground annexed to Buckingham Palace), I have estimated, as in June 1855, at 45,632 *l.*; but whether this sum will or will not compensate the Land Revenues according to the terms of the agreement of 5th July 1853, I have not attempted to estimate, because the result must depend entirely upon the interpretation which may given by the arbitrator to the clause in that agreement, which directs the manner in which the ground annexed to Buckingham Palace is to be valued.

It appears from the Statement No. 4, hereto annexed, that the liabilities upon the undertaking at the present time amount to about 12,925 *l.*; and that the cash in hand, including arrears of rent, is 8,314 *l.* 19 *s.* 7 *d.*, which shows a present deficiency of 4,610 *l.*, which has been provided for by a mortgage on the Tomlinson Estate for 5,750 *l.*

The cost of purchasing all the properties east of the Gun Tavern, and one house, with a large garden west thereof, with contingencies, will probably amount to 15,000 *l.*, which, added to the present deficiency, makes about 20,000 *l.*, for which only, as I submit, it would be necessary to make provision in the present year, even supposing the improvement to be continued vigorously.

When the properties named have been purchased and pulled down, the greater part of the building ground will become available for letting; and the three houses west of the Gun Tavern which will then remain may be purchased in the subsequent year, or progressively, as circumstances may dictate.

The pulling down of the Gun Tavern alone will not materially advance the improvement, because not any of the building ground can be let with advantage (if at all) until the houses in Stafford-place shall have been pulled down; for which reason it is that no steps have yet been taken for letting any of the land which will be available for building purposes.

I am, &c.
(signed) *James Pennethorne.*

The Right Honourable the
First Commissioner of Her Majesty's
Works, &c.

No. 1.—Statement in Reply to First part of Question No. 1

Question.—" The amounts of the different estimates prepared by me from time to time of the cost of these Improvements."

First Estimate, May 1852, for the original Line.

Return to an Order of the House of Commons, 28th May 1852.

The monies required for carrying into execution the purposes of the Pimlico Improvement Bill, and to be raised as therein provided for, 30,000 *l.*

Note.—This estimate is irrespective of the return to be derived from the letting of improved frontages, the value of which cannot be estimated until the improvement shall be completed.

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Second Estimate, 7th March 1855, for the extended Line.

	£.	s.	d.	£.	s.	d.
ASSETS:						
Monies received	25,191	9	11			
Monies due and properties unsold	8,352	–	–			
Houses not to be sold	8,000	–	–			
Building ground, new street, 800*l.* per annum, at 28 years' purchase	22,400	–	–			
Building ground, Arabella-row, 200*l.* per annum, at 28 years' purchase	5,600	–	–			
				69,543	9	11
OUTGOINGS:	£.	s.	d.			
Monies expended	4,435	–	6			
Liabilities	23,041	16	9			
Further purchases	21,000	–	–			
Works and contingencies	5,000	–	–			
				53,476	17	3
Estimated Surplus to be returned to the Land Revenues in addition to 4,300*l.* already received by them			£.	16,066	12	8

Third Estimate, 2d June 1855.

The previous estimate of 7th March was founded on the assumption that power would be obtained to enable the Commissioners to sell the property at the corner of Arabella-row, and the building ground fronting the new street; but as it was considered that such an appropriation of the properties would have been at variance with the Act of 1853, and inconsistent with the agreement existing between the First Commissioner of Works and the Commissioners of Woods, that estimate was set aside, and the present was prepared, not as a general estimate, but to show what further sum would be required to complete the improvement, supposing the houses, Nos. 30 to 37, Stafford-place, to be purchased for enlarging the building ground.

	£.	s.	d.	£.	s.	d.
OUTGOINGS:						
For the purchase of properties	25,700	–	–			
For works and contingencies	5,900	–	–			
	31,600	–	–			
ASSETS:						
Less cash in hand and estimated returns from properties to be sold	6,600	–	–			
Sum to be provided				25,000	–	–
The value of the properties to be returned to the Land Revenues, including the Duchy of Cornwall, but exclusive of the ground at the corner of Arabella-row				45,632	–	–

Fourth Estimate, 12th March 1856. (Printed by Order of The House of Commons, 9th May 1856.)

	£.	s.	d.	£.	s.	d.
OUTGOINGS:						
Liabilities	7,489	10	11			
Purchases required to complete the improvement, estimated at	23,200	–	–			
Roads, contingencies, &c.	5,000	–	–			
				35,689	10	11
ASSETS:						
Cash in hand	1,554	19	6			
Purchase money due, and estimated value of properties sold and to be sold	7,273	8	–			
				8,828	7	6
Sum to be provided			£.	26,861	3	5

In the report to which the above estimate was annexed, the sum stated to be required for completing the improvement was 27,000*l.*

Pimlico Improvements.

No. 2.—STATEMENT in reply to Second part of Question No. 1, and First part of Question No. 4.

Question No. 1.—"The amounts estimated as produce from the contemplated sales of properties."

May 28, 1852.—Estimated value of the properties to be sold - - - £. 30,000

Question No. 4.—"The amount realized by the property derived from land revenues already sold, exclusive of that added to Buckingham Palace."

	£.	s.	d.
August 12, 1853. - First sale - - - - - - - -	11,890	–	–
July 21, 1854. - Second sale - - - - - - - -	11,530	–	–
February 29, 1856. Third sale - - - - - - - -	5,470	–	–
Nos. 5 and 6, Palace-street, not sold - - - - - -	200	–	–
Nos. 12, 13, and 14, William-street, not sold - - -	175	–	–
£.	29,265	–	–

No. 3.—STATEMENT in reply to the Second part of Question No. 4, the Question No. 5, and the First part of Question No. 6.

Second part of Question No. 4.—"The estimated value of the residue of the property derived from the land revenues not required for the improvements."

Question No. 5.—"The same information as to property obtained from other sources."

First part of Question, No. 6.—"The estimated value of the building land after the improvements shall have been completed, according to the Act of 1853."

See Estimate of 2d June 1855.

	£.	s.	d.
Value of houses, &c. not to be sold - - - - - -	8,032	–	–
Ditto - - - of building land - - - - - -	33,300	–	–
Ditto - - - sold to the Duchy of Cornwall, and paid to land revenues - - - - - - - - -	4,300	–	–
£.	45,632	–	–

N. B.—It has been deemed more useful to reply to the above three questions by one statement, because, as respects the building land, the portion derived from the land revenue and that from the Tomlinson estate, cannot be accurately divided: the details of the above estimate will be found annexed to the report of June 2d, 1855.

No. 4.—STATEMENT in reply to Question No. 3.

Question.—"The amount required from the present time to complete the undertaking according to the Act of 1853."

	£.	s.	d.	£.	s.	d.
1. Liabilities:						
To the Trustees of Ward - - - - -	5,750	–	–			
William Rackstraw - - - - - -	5,675	–	–			
Michael Howard - - - - - - -	700	–	–			
For Surveyors, &c., say - - - - -	800	–	–	12,925	–	–
Purchases not agreed:						
Messrs. Pinney - - - - - - -						
W. G. T. Barter - - - - - -						
Thomas Bew - - - - - - -						
E. Weatherley - - - - - - -						
G. H. Stevens - - - - - - -						
C. Grover - - - - - - - -						
James Booty - - - - - - -						
Thomas Edy - - - - - - -						
Thomas Imrie - - - - - - -						
Sugg & Bushy - - - - - - -				18,200	–	–

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				£.	s.	d.
2. Roads and temporary wooden fences				2,000	–	–
3. Contingencies				3,000	–	–
				36,125	–	–
Deduct—						
Cash in hand, March 1857	£. 7,614	19	7			
Arrears of rent, say	700	–	–			
				8,314	19	7
Sum to be provided - - - £.				27,810	–	5

N. B.—No provision has been made in the above estimate for interest on mortgage, now payable to the trustees of Ward, because it would be more than covered by the rents arising out of the properties which have been purchased.

A sum of 300 *l.* may be required for a small sewer to drain the houses, but it has not been included in the above estimate, because the cost should fall upon the lessees.

The iron railing or brick wall to enclose the lands to be added to Buckingham Palace, has been excluded from the above, as from the former estimates.

No. 5.—Statement in reply to Question No. 2.

Question.—"The amount expended upon the entire undertaking up to the present time."

Receipts.	£.	s.	d.	£.	s.	d.
Year ended 31st March 1854	13,284	15	–			
" 1855	12,014	15	11			
" 1856	1,880	1	4			
To 28th February 1857	5,603	1	7			
				32,782	13	10
Expenditure.						
Year ended 31st March 1854	3,471	19	11			
" 1855	2,054	9	5			
" 1856	18,539	18	6			
To 28th February 1857	1,101	6	5			
				25,167	14	3
Balance in hand the 28th February 1857 - - - £.				7,614	19	7

N. B.—The above is copied from a statement furnished by Mr. Goodliffe, the accountant to the Commissioners of Works, to me.

The following is a Summary of the Five preceding Statements, arranged in the order of the Six Questions contained in Mr. *Austin's* Letter of 21st January 1857.

Question No. 1.

"The amounts of the different estimates, prepared from time to time, of the cost of the *Pimlico* Improvement."

	£.	s.	d.
I.—28th May 1852. The money required for carrying into execution the purposes of the Pimlico Improvement Bill, *i. e.* for a short line of street near the Palace	30,000	–	–
II.—19th May 1853. The funds applicable having been increased to 38,000 *l.*, by contracts for purchase made by Mr. Elliot, the line of street was removed further from the Palace, and extended	38,000	–	–

Pimlico Improvements.

	£.	s.	d.
III.—2d June 1855. Mr. Elliot not having completed his contracts, and an adverse verdict having been given in the case of the Rev. J. P. Tomlinson and others, the architect reported to the Board that the cost of the Improvement had been increased by these circumstances 13,500*l.*, and would be still further increased by the value thereby given to the remaining property. A new estimate was accordingly submitted, showing that the sum required to complete the Improvement, beyond the cash then in hand and the value of the properties then unsold, would be - - - - - - - - -	25,000	–	–
IV.—12th March 1856. Further purchases having been made, and nearly all the properties having been sold, an estimate was prepared for Parliament that the sum then required to complete the Improvement would probably be - - - - - - - - - -	26,862	–	–
The only estimate which has been made of the produce from the contemplated property was that of May 1852 - - - - - -	30,000	–	–

Question No. 2.

"The amount expended upon the entire undertaking up to the 28th February 1857."

	£.	s.	d.
As per return made by Mr. Goodliffe - - - - - - -	25,167	14	–

Question No. 3.

"The amount required from the present time to complete the undertaking, according to the Act of 185 3"

	£.	s.	d.	£.	s.	d.
Liabilities for purchases - - - - - - -	12,925	–	–			
Estimated cost of future purchases - - - -	18,200	–	–			
Estimated cost of roads and temporary fences - -	2,000	–	–			
Contingencies - - - - - - - - -	3,000	–	–			
	36,125	–	–			
Deduct,						
Cash in hand and estimated arrears of rent -	8,314	19	7			
				27,810	–	5

Question, No. 4.

"The amount realized by the property derived from the Land Revenue."

	£.	s.	d.	£.	s.	d.
First sale - - - - - - - - - -	11,890	–	–			
Second - - - - - - - - - -	11,530	–	–			
Third - - - - - - - - - -	5,470	–	–			
	28,890	–	–			
Properties, the proceeds from which have been calculated upon for the improvement, but which have not yet been sold - - - - - -	375	–	–			
				29,265	–	–
The estimated value of the property derived from the land revenues, and not required for the improvement - - - - - -				4,367	–	–

Question No. 5.

	£.	s.	d.
"The amount realised from property obtained from other sources than land revenue" - - - - - - - - - - - - -	–	–	Nil.
The estimated value of the residue of the property derived from other sources not required for the improvement, including a small garden, let on lease to Mr. Nesbit, and not to be let for building purposes - - - - - - - - - - - - -	3,665	–	–

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Question No. 6.

"The estimated value of the building land after the improvement shall have been completed, according to the Act of 1853:"

	£.	s.	d.	£.	s.	d.
Land to be let, estimated at 1,110*l.* per annum, at 30 years' purchase	33,300	–	–			
Land already sold to the Duchy of Cornwall	4,300	–	–			
				37,600	–	–

"The steps which have been taken for letting such portion of the land as is now available for building purposes"	None is really available.

V.—NEW STREET FROM SPITALFIELDS TO SHOREDITCH.

New Street from Spitalfields to Shoreditch.

Sir, Office of Works, &c., 21 January 1857.

THE First Commissioner of Her Majesty's Works, &c., not being able from your previous reports to arrive at any satisfactory conclusion as to the ultimate cost of the formation of the new street from Spitalfields to Shoreditch, has directed me to request that you will, without delay, furnish him with the information required in as clear and concise a manner as possible under the following heads:—

1. A statement of the amounts of the different estimates of the cost of the undertaking, and the amounts to be realized, with the dates of those estimates submitted by you to the Office of Woods and Works, or to this Office, and showing upon which of them the undertaking has proceeded.

2. The entire expenditure of every description upon the undertaking to the present time.

3. The amount required from the present time to complete the undertaking, to be given under the following heads; viz.
    1. Purchases.
    2. Works (in detail).
    3. Contingencies.
    4. Other expenses.

4. The value of the land applicable to building purposes when cleared of the existing houses and buildings.

5. The value of the existing house property (if any) vested in the Commissioners of Her Majesty's Works, and not intended to be pulled down.

The First Commissioner also desires to know what steps have been taken towards realizing the value of the property applicable to building purposes; and further, the extent of sewage works included in the estimates, which have been executed.

I am, &c.

J. Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Office of Works, &c., 17 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your immediate attention to this Board's letter of the 21st ultimo, requesting information on various points relating to the new street from Spitalfields

New Street from Spitalfields to Shoreditch.

Church to Shoreditch, and to beg that you will furnish him with such information with as little further delay as possible.

I am directed to add that you can have the fullest access to all documents in this office which may be useful to you in preparing the information desired.

I am, &c.

J. Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Office of Works, &c., 26 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your attention to his letters of the 21st January last, and the 17th instant, in which certain information respecting the amount expended to the present time, upon the street from Spitalfields Church to Shoreditch, the amount required for its completion, and other matters relating to that undertaking; and I am to request, as he is much inconvenienced by the delay which has occurred in your answering these letters, that you will immediately furnish him with a statement of the reason of your not having sent him the information asked for.

I am, &c.

James Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, 7 Whitehall-yard, 27 February 1857.

IN reply to Mr. Austin's letter of yesterday, respecting the Spitalfields extension line of street, I beg leave to inform you that I have been anxious before making my report for the completion of the purchase of the Wheeler estate, which I am informed is now in a very forward state. When that purchase has been completed, and when the arrangements have been made with the Metropolitan Board respecting the sewer, the costs of the undertaking hereafter to be incurred will have been reduced to so small a sum as to become almost a certainty, and the only real subject of estimate will be the value of the returns, and a report then will be much more complete and satisfactory than I could make now; and as there is not any question respecting funds depending upon it, I trust you will permit the postponement.

I have, &c.

(signed) *James Pennethorne.*

The Right Honourable the
First Commissioner of Her Majesty's Works, &c.

Sir, Office of Works, &c., 2 March 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 27th ultimo, respecting the Spitalfields extension line of street; and I am to inform you that the First Commissioner is anxious to have the information required by my letters of the 21st January and the 17th ultimo.

I am also directed to add, in order that there may not be any ground for further delay, that the First Commissioner desires that you will forward that information forthwith; and to enable you to do so, that you may set down as sums for the completion of the purchase of the Wheeler estate, and the cost of the construction of the sewer, those amounts which, with the information you are already possessed of, you may consider sufficient for those objects.

I am, &c.

J. Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

New Street from Spitalfields to Shoreditch.

Sir, Office of Works, &c., 29 April 1857.

The First Commissioner of Her Majesty's Works, &c., not having received as yet an answer from you to his letter of the 2d ultimo, requesting an immediate report from you in regard to the new line of street from Spitalfields Church to Shoreditch, I am directed by him to request that you will furnish him with the information therein called for as quickly as possible.

I am, &c.

J. Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, Office of Works, &c., 9 May 1857.

I am directed by the First Commissioner of Her Majesty's Works, &c., with reference to my letter of the 29th ultimo, again to request an immediate report in regard to the new line of street from Spitalfields Church to Shoreditch.

I am, &c.

J. Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, 7, Whitehall Yard, 11 May 1857.

Referring to Mr. Austin's letter of the 9th, and to his previous letters, requesting a report from me respecting the new line of street from Spitalfields Church to Shoreditch, I beg leave to say that on my return to London I will make the report desired, and in the meantime request the favour of you to direct your accountant, Mr. Goodliffe, to furnish me with a detailed statement of the receipts and expenditure, made up to the present time.

I have already stated, verbally, my reasons for having hitherto postponed making the report, which, as I presume, is not required for any immediate or financial purpose; and I would take the liberty respectfully to observe, that as, after a further period of six weeks or two months, the arrangements respecting the railway company, the paving, &c., will have been concluded, and the outlay reduced to a certainty, and as the whole undertaking will then be so far advanced that almost the only subject of estimate will be the value of the vacant ground to be let for building purposes, I still think the report would be much more satisfactory to you, and much more useful, if made then, rather than at the present time.

I have, &c.

The Right Honourable the
First Commissioner of Her Majesty's
Works, &c. (signed) *James Pennethorne.*

Sir, Office of Works, &c., 13 May 1857.

The First Commissioner of Her Majesty's Works, &c. has had before him your letter of the 11th instant, stating that you will, on your return to London, make the report called for by him respecting the new line of street from Spitalfields Church to Shoreditch, but that it would be more complete if it could be delayed for six weeks or two months; and I am directed to acquaint you that the information requested by the First Commissioner is necessary to enable him to complete a report to the Treasury now in preparation, and that it is requisite that he should receive it without delay.

The First Commissioner requests, therefore, that you will at once furnish him with your report.

The accountant of this department has been directed to furnish the statement of receipt and expenditure required by you.

I am, &c.

J. Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

New Street from Spitalfields to Shoreditch.

Sir, 7, Whitehall Yard, 19 May 1857.

Referring to Mr. Austin's letter of the 21st January last, and subsequent letters on the same subject, I annex hereto five statements respecting the estimates and the cost of the new street from Spitalfields Church to Shoreditch, as returns to the five questions or heads prescribed by Mr. Austin's said letter.

The steps which have been taken towards realising the value of the property applicable to building purposes will be ascertained from the return made to the Question, No. 5.

The sewer has been constructed northwards to Fleur-de-Lis-court; the remainder of it is now in course of construction, at a cost of 440 *l.*

I have, &c.
(Signed) *James Pennethorne.*

The Right Honourable the
First Commissioner of Her Majesty's
Works, &c.

Question, No. 1.

New Street—Spitalfields Church to Shoreditch.

A STATEMENT of the Amounts of the different Estimates of the Cost of the Undertaking, and the Amounts to be realised, submitted to the Office of Woods and Works, or to the Office of Works, by the Architect, and showing upon which of them the Undertaking has proceeded.

No. 1.—The First Estimate submitted by me to the Commissioners of Her Majesty's Woods and Works was in my Report of the 6th May 1847, and was for the New Street as authorised by the Act 9 & 10 Vict. cap. 34; except the northern portion thereof, then intended to be executed by and at the cost of the Eastern Counties Railway Company, viz.:

EXPENDITURE.				RETURNS.			
	£.	s.	d.	Ground Rents:	£.	s.	d.
Purchases of freeholders' interests - - - -	91,497	14	4	£. 2,540 per annum, at 28 years - - - -	71,120	–	–
Leaseholders - - -	50,592	7	1	Building Rents:			
	142,090	1	5	£. 1,400 per annum, at 20 years - - - -	28,000	–	–
Added to the above for expenses, 8 per cent., being the amount incurred in the former portion of street -	11,367	4	–	Old materials - - -	3,000	–	–
				The Wheeler estate, to be repaid by the railway company - - -	8,750	–	–
Cost for paving the street, for the sewer, and for the vaults - - - -	7,000	–	–	Plants of brewery, wheelworks, &c. - - -	2,000	–	–
				Two public-house licences -	500	–	–
	160,457	5	5	Say, re-payment by lessees of one-half of the expenditure on vaults, sewer, and pavements - -	3,500	–	–
	116,870	–	–	- - - - - £.	116,870	–	–
Net Outlay without interest - - £.	43,587	5	5				

Note.—The above estimate supposed that the required funds would have been forthwith provided, and that within 18 months the purchases would have been completed, and the street, from end to end, be opened for public traffic.

New Street from Spitalfields to Shoreditch.

No. 2.—The Second Estimate submitted by me to the Commissioners of Her Majesty's Woods and Works, was in my Report of 27th May 1850; it had reference to purchases only, and applied to the whole line of street, including the opening into Shoreditch, viz.:—

	£.	s.	d.	£.	s.	d.
Claims settled up to 27th May 1850 - -	115,015	13	6			
Properties included in the first estimate, and remaining to be purchased - - - - - -	36,325	4	8			
				151,340	18	2
Properties which the Railway Company had undertaken to purchase:						
Light blue - - - - - - - - -	13,395	–	–			
Light red - - - - - - - - -	5,050	–	–			
Dark red - - - - - - - - -	12,745	–	–			
				31,190	–	–
			£.	182,530	18	2

Note.—At the date of the above report, it was hoped that the railway company would have surrendered without compensation the property coloured light blue, and valued at 13,395 *l.*, but eventually the Commissioners of Works were compelled to pay for that property. On the other hand, a large saving was effected on the properties coloured light red and dark red, by the leases being allowed to run out.

The total sum expended by the Commissioners of Works for all the purchases has been, viz.:—

	£.	s.	d.
Amount paid as per the following statement furnished by Mr. Goodliffe - - - - - - - - - - - -	167,836	–	2
Amount remaining to be paid for the Wheeler Estate, say -	5,005	–	–
Ditto - ditto purchases not yet agreed for, say - - -	995	–	–
£.	173,836	–	2

No. 3.—ESTIMATE of Cost of PROPERTIES to be purchased, and of WORKS to be executed, reported 15th June 1852.

	£.	s.	d.	£.	s.	d.
PROPERTIES:						
Estimated cost of purchases not yet agreed for, south of the Eastern Counties Railway property (exclusive of Messrs. Soames, who are not to be removed) -	7,000	–	–			
Estimated cost of properties at the north end of line, for which notices were recommended to be given in report of 26th November 1851 - - - -	16,500	–	–			
				23,500	–	–
WORKS:						
Estimated cost of vaults and paving already contracted for - - - - - - - - -	2,500	–	–			
Ditto - - ditto not contracted for - - - - -	1,700	–	–			
				4,200	–	–
			£.	27,700	–	–

The above estimate supposes that it will not be necessary to buy up the interest of the Eastern Counties Railway Company, nor the interests of the lessees of the houses Nos. 31, 32, 33, 34, and 35, Shoreditch, with the stone-yard behind.

Note.—The undertaking was commenced upon the estimate No. 1, and is now being completed upon the estimates No. 2 and No. 3.

Question, No. 2.

ABSTRACT ACCOUNT of the TOTAL RECEIPTS and EXPENDITURE upon the Spitalfields Extension Line of Improvement from Spitalfields Church to Shoreditch, copied from Statement made up to the 31st March 1857, by Mr. *W. G. Goodliffe.*

RECEIPTS.

PERIOD.	Loans of Bank of England.	Produce of Sale of Stock, 3 per Cents.	Net Produce of 1*d.* Coal Duty.	Rents.	Interest of Stock.	Sale of Fixtures, Old Materials.	Consideration Money for Under-Lease.	Loan Commissioners of Greenwich Hospital.	TOTAL.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
To 5 January 1848	- - -	857 10 –	- - -	- - -	- - -	- - -	- - -	- - -	857 10 –
31 March 1848	- - -	3,272 18 5	- - -	- - -	- - -	- - -	- - -	- - -	3,272 18 5
31 March 1849	- - -	27,733 5 6	- - -	29 – 10	- - -	15 6 –	- - -	- - -	27,777 12 4
31 March 1850	50,919 7 –	- - -	10,036 17 5	172 9 –	- - -	1,984 19 4	- - -	- - -	63,113 12 9
31 March 1851	37,000 – –	- - -	14,647 17 7	101 1 –	- - -	1,422 17 1	- - -	- - -	53,171 15 8
31 March 1852	25,000 – –	11,092 – 6	13,654 13 4	- - -	500 – 3	1,143 14 10	- - -	- - -	51,390 8 11
31 March 1853	- - -	- - -	14,337 15 6	32 5 10	- - -	771 17 1	- - -	- - -	15,141 18 5
31 March 1854	24,239 16 6	- - -	15,147 9 5	126 11 –	- - -	- - -	- - -	- - -	39,513 16 11
31 March 1855	- - -	- - -	16,351 15 4	590 1 9	- - -	142 14 11	- - -	- - -	17,084 12 –
31 March 1856	- - -	- - -	15,515 12 8	263 7 –	- - -	325 8 2	100 – –	- - -	16,204 7 10
31 March 1857	- - -	- - -	15,956 4 11	283 8 2	- - -	48 10 –	- - -	20,000 – –	36,288 3 1
TOTALS - - - £.	137,159 3 6	42,955 14 5	115,648 6 2	1,598 4 7	500 – 3	5,855 7 5	100 – –	20,000 – –	323,816 16 4
Deduct Principal of Loans paid off, *vide* "Payments" - - - - - -									97,724 15 9
Actual Receipts - - - - - £.									226,092 – 7

PAYMENTS.

PERIOD.	Principal of Loans paid off.	Interest of Loans.	Purchase Money and Compensation to Tenants at Will.	Interest of Purchase Money.	Surveys, Valuations, and Costs of Awards.	Law Charges.	Rent of Property purchased.	Works, including Salary and Disbursements of Clerk of Works.	Payments to Architect.	Miscellaneous Payments.	TOTAL.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
To 5 January 1848	- - -	- - -	350 – –	- - -	26 – –	- - -	- - -	- - -	- - -	- - -	376 – –
31 March 1848	- - -	- - -	3,530 – –	- - -	- - -	- - -	- - -	- - -	- - -	1 1 6	3,531 1 6
31 March 1849	- - -	- - -	25,622 16 –	- - -	642 12 1	313 13 11	- - -	- - -	- - -	55 11 10	26,634 13 10
31 March 1850	9,530 5 6	521 16 3	49,860 1 –	257 15 8	248 15 2	1,122 8 6	671 3 9	145 19 5	- - -	240 14 –	62,598 19 3
31 March 1851	12,463 8 10	2,250 1 3	34,730 11 –	9 2 5	354 16 4	2,394 8 8	1,314 12 4	950 11 2	1,423 3 4	491 7 5	56,382 2 9
31 March 1852	10,837 14 3	2,901 11 6	19,057 – –	- - -	173 6 –	318 7 3	613 5 5	3,897 19 9	- - -	450 1 1	38,249 5 3
51 March 1853	11,326 16 6	3,101 8 1	- - -	- - -	- - -	1,742 10 11	369 6 7	2,566 8 2	300 – –	226 16 6	19,633 6 9
31 March 1854	9,321 – 5	2,014 19 –	1,653 15 –	107 10 –	- - -	545 2 6	220 12 6	1,441 2 8	200 – –	459 3 5	15,903 4 6
31 March 1855	16,705 8 9	3,710 16 –	13,141 3 –	237 7 5	- - -	824 9 6	196 7 6	1,369 15 7	- - -	446 6 2	36,631 13 11
31 March 1856	13,338 11 2	2,378 12 3	3,675 18 6	137 16 5	178 1 6	274 14 9	190 10 –	2,042 11 6	- - -	446 9 2	22,613 5 3
31 March 1857	14,151 10 4	1,933 12 8	16,214 16 8	981 2 10	- - -	- - -	263 4 10	244 8 3	- - -	29 5 5	33,809 1 –
TOTALS - - - £.	97,724 15 9	18,712 17 –	167,836 – 2	1,730 14 9	1,623 11 1	7,535 16 –	3,839 2 11	12,658 16 6	1,923 3 4	2,837 16 6	316,422 14 –
Deduct Principal of Loans paid off - - - - -											97,724 15 9
Actual Expenditure - - - - - £.											218,697 18 3

New Street from Spitalfields to Shoreditch.

Question, No. 3.

The Amount required from the present Time to complete the Undertaking.

	£. s. d.	£. s. d.
No. 1.—PURCHASES:		
The Wheeler Estate, agreed for in the year 1849	5,005 – –	
Mr. Rutty and Mr. Oliver, &c.	995 – –	
		6,000 – –
No. 2.—WORKS:		
Sewers and Vaults, &c.	1,000 – –	
Pavements	2,000 – –	
		3,000 – –
Contingencies		3,000 – –
	£.	12,000 – –

Note.—The above estimate is irrespective of the rents which now are and will become receivable from the estate, and of the rates, taxes, and interest on borrowed monies which now are or will become payable.

Question, No. 4.

The Value of the Land applicable to Building Purposes when cleared of the existing Houses and Buildings.

		£. s. d.
West Side of Street:		
1. From White's-row to Lamb-street	Rent per Annum	122 – –
2. Lamb-street to White Lion-street	"	240 – –
3. White Lion-street to Fleur-de-Lis-street	"	332 – –
4. Fleur-de-Lis-street to Elder-street	"	64 – –
5. Elder-street to Shoreditch	"	157 – –
East Side of Street:		
6. Shoreditch to Wheeler-street	"	666 – –
7. Wheeler-street to Vine-court	"	262 – –
8. Vine-court to Brown's-lane	"	184 – –
9. Brown's-lane to Fashion-street	"	328 – –
Estimated TOTAL Annual Rent to be derived from Ground	£.	2,355 – –

Question, No. 5.

The Value of the existing House Property (if any) vested in the Commissioners of Her Majesty's Works, and not intended to be pulled down.

	£. s. d.	£. s. d.
Properties Let:		
Stable Yard, let to Messrs. Phillips & Bower for 80 years	45 – –	
Stable Yard, House, and Buildings, let to Mr. William Robert Ringer for a term of 80 years	80 – –	
Houses, Buildings, &c., at the corner of Union-street, let to Mr. John Thomas Hart	70 – –	
		195 – –
Properties to be Let:		
Houses, Nos. 4 and 5, Wheeler-street	25 – –	
South part of Gaskell's Brewery	70 – –	
North part of - ditto	130 – –	
No. 7, Fleur-de-Lis-street	40 – –	
Two Houses, Blossom-street	35 – –	
Five Houses, Blossom-terrace	100 – –	
Warehouses, Sheds, and Stabling in Peck's Yard (late Messrs. Hall's)	175 – –	
		575 – –
Estimated TOTAL Annual Rent to be derived from Buildings	£.	770 – –

METROPOLITAN IMPROVEMENTS.

COPY of REPORT, dated 22 June 1857, made to the TREASURY by the FIRST COMMISSIONER of WORKS, in relation to the present State of the METROPOLITAN IMPROVEMENTS under the Direction of his Department; together with a COPY of the CORRESPONDENCE referred to in that Report.

(*Sir Benjamin Hall.*)

Ordered, *by* The House of Commons, *to be Printed*,
26 *June* 1857.

[*Price* 1 *s*.]

130—Sess. 2.

Under 12 *oz.*

METROPOLITAN IMPROVEMENTS.

RETURN to an Order of the Honourable The House of Commons,
dated 31 July 1857;—*for*,

COPY "of LETTER from the FIRST COMMISSIONER of HER MAJESTY'S WORKS, &c. to the TREASURY, dated the 28th day of July, containing COPY of CORRESPONDENCE referred to in that Letter (in continuation of Parliamentary Paper, No. 130, of Session 1857)."

COPY of LETTER from the FIRST COMMISSIONER of HER MAJESTY'S WORKS, &c. to the Treasury, dated 28 July, containing COPY of CORRESPONDENCE referred to in that Letter.

My Lords, Office of Works, &c., 28 July 1857.

WITH reference to my report to your Lordships of the 22d ultimo, in relation to the present state of the various improvements in the Metropolis now being carried out under the direction of this department, I beg leave to transmit to your Lordships herewith copy of a letter, dated the 11th instant, which I have received from Mr. Pennethorne, on the subject, and also copy of the subsequent correspondence.

I am, &c.
(signed) *B. Hall.*

The Right Hon. the Lords Commissioners
of Her Majesty's Treasury.

APPENDIX.

Sir, 7, Whitehall-yard, 11 July 1857.

YOUR report to the Lords of Her Majesty's Treasury upon Metropolitan Improvements, dated the 22d ultimo, having been, upon your Motion, presented to the House of Commons, and ordered to be printed, I shall take the liberty to submit some remarks thereon, confident that you, who cannot possibly have any motive or desire to injure my professional reputation, will readily receive such explanation as I wish to offer.

In that report you particularly invite their Lordships' attention to the correspondence appended to it (carried on in great part with me), as exhibiting some of the difficulties you have had to encounter; this may not be intended to impute to me either unwillingness or delay in affording information, but I feel that the words may be construed as conveying such imputation, and in fact they have been so construed in more than one public paper.

With respect to these alleged difficulties, I have to observe, that I was required to report upon several undertakings at the same time, in addition to the current business of the office, which could not be postponed.

As respects Battersea Park: on the 15th January last you called upon me for information; on the 29th I replied generally, and requested to be furnished by your accountant with a statement of the receipt and expenditure, to enable me to give such information.

On the 26th February I explained in writing (as I had before done verbally), why I thought the information required could be given more satisfactorily if postponed until after the 31st March, the end of the financial year, when the works then in progress would be completed, and on the 11th March, at your desire, I sent in the full and elaborate statement which is appended to your report.

As respects the Spitalfields Improvement, I cannot but think that, for reasons given in the correspondence, it would have been advantageous if my report had been postponed even longer than it was. The reports I had to make, to be of any value, were necessarily founded on accounts and estimates which occupied much time. Plans also had to be prepared; and I cannot see how I could in a shorter period have furnished satisfactorily all the details called for. I trust, however, that all my reports are so full and explicit as at least to leave me clear of all imputation of having thrown difficulties in your way, even if I have not been able to give you information and assistance as prompt and as valuable as I wished to give.

Another point I would refer to before proceeding to the chief subjects of your report, is the allegation that Battersea Park, the Pimlico Improvements, and the New Street from Spitalfields, have been executed under my management and " control."

My management of these undertakings has been very limited, and confined to my duties as surveyor, acting under the Commissioners of Woods and Works, who have had and exercised the sole management and control of the funds, and the control over myself and the whole of the undertakings.

The funds for Battersea Park were intended, when the Act was passed in 1846, to be derived from the sale of the Foreshore at Birkenhead; when that source failed, a second Act was passed, in 1848, to enable the Exchequer Bill Loan Commissioners to advance 200,000 *l.*, but they had not the money at command, and could only advance it by comparatively small instalments spread over seven years, the last being in 1854. By this want of funds many expenses not contemplated by the original estimate were incurred; all others were increased, and large sums became payable for interest on these borrowed monies and on the purchases agreed for; new businesses were established on the site, and the completion of the purchases was delayed for years, though the properties were constantly rising in value, and to such an extent, that land was purchased in 1848 under 200 *l.* an acre, and exactly similar and adjoining land, in 1854, cost by arbitration 800 *l.* an acre, and the total cost of the purchases was by these causes alone increased above 44,000 *l.*

This want of funds, and the expenses and delays occasioned thereby, were the sole causes of the increased expenditure at Battersea, and over these circumstances, as surveyor only, I could not and did not exercise any control.

In like manner, at Spitalfields the want of funds operated to increase the expenditure; but it was also increased above 30,000 *l.* by the Eastern Counties Railway Company failing in their agreement to purchase the properties and form and complete the northern end of the line; over these circumstances I could not, and did not, exercise any control.

Respecting Excess of Estimate.

Accompanying your report is an abstract of the correspondence, from which you state, it will be observed that the excess upon the several estimates has been at Battersea Park 111,065 *l.* 6 *s.* 11 *d.*, and at the New Street, Shoreditch, 20,467 *l.* 0 *s.* 1 *d.*, both of which sums appear to me incorrect.

Regarding Battersea Park the following is the Statement No. 1, in the abstract referred to:

	£.	*s.*	*d.*
Total Cost of the Works when completed - -	376,999	2	10
Amount of Estimate of March 1847 - - -	265,933	15	11
Excess - - -	111,065	6	11

In the first place, the cost of the works will not be 376,999*l.* 2*s.* 10*d.*, and need not exceed 325,000*l.*, exclusive of the embankment. The difference arises from the embankment, 35,000*l.*; from the works which I think may be postponed, or altogether omitted, about 15,350*l.*; and from two mistakes, amounting together to 6,000*l.*; first, the sum of 1,500*l.*, included in the statement for fencing has been already voted in the sum of 8,069 *l.* 14 *s.* for maintenance; secondly, no credit has been taken for a sum of about 4,500 *l.*, the cash in hand when my statement was made up.

In the next place, the amount of the estimate, 265,933*l.* 15*s.* 11*d.* ought to be increased by a sum of above 10,000*l.*, which has been paid for interest on borrowed monies, that item having been specially excluded from the estimate (to say nothing of all the other expenses occasioned by the want of funds and the delays).

I also think it is hardly fair to include in the comparison an addition of 10,000 *l.* to Mr. Page's estimate of 25,000 *l.* for the river embankment, for with that work I am not connected; it has not yet been commenced, and the increased outlay may not arise. The estimate of 265,933 *l.* 15 *s.* 11 *d.* would not have been exceeded if the undertaking had proceeded immediately after that estimate had been made, and the present exceeding, such as it is, is not to be ascribed to me, but to the failure of the funds, and the expenses and delays occasioned thereby, as I have before explained.

As connected with this part of the subject, I may add that the total expenditure upon the undertaking up to the present time, including all liabilities and 2,500*l.* for the completion of the five public roads, will be under 325,000*l.*, which is only about 12,000*l.* above the estimate submitted to Parliament in 1853 (allowing the rents to be applicable to the undertaking as that estimate did), and the total amount to be obtained from the sale of the building lands, after ground-rents shall have been established upon them, was estimated in March 1847 at 322,189 *l.*; possibly this estimate may not be realised, but the Crystal Palace Railway Company have already agreed to pay a sum of 61,600*l.* for 21 acres and a pier, which is assuring; and I think that there is little doubt but that the ultimate cost to the public of this park, 200 acres in extent, with all the levels raised, and the park completely planted and laid out, will not be more than the present value of the bare ground.

Regarding the New Street, Spitalfields, the following is the statement, No. 5, in the abstract referred to:—

	£.	*s.*	*d.*
Total Cost of the Works - - - - -	230,697	18	3
Estimates 1850 and 1852 - - - - -	210,230	18	2
Excess - - - £.	20,467	–	1

The stated excess of 20,467 *l.* 0 *s.* 1 *d.* should be reduced to 13,062 *l.* 17*s.* 9*d.*, by subtracting from it the sum of 7,404*l.* 2*s.* 4*d.*, the amount of cash in hand on the 31st March last. That excess is owing altogether to want of funds, and the consequent expenses and delays created thereby, as in Battersea Park; for which, as in Battersea Park, I cannot be held responsible.

Respecting the proposed Application for a Grant.

I now proceed to speak upon the last part of your report, which recommends that application be made to Parliament for a grant of 170,512 *l.* 8 *s.* 9 *d.* This subject does not affect me so directly as the imputations already noticed; but as an unwelcome result, if a fact, it would reflect upon all who have been concerned in these improvements. I do not, however, think that there is any necessity to apply to Parliament for a grant of 170,512 *l.* 8 *s.* 9 *d.*, or of anything like that sum.

The following is your summary of the sums required to complete the several undertakings:—

	£.	*s.*	*d.*
1. Battersea Park - - - - - -	69,909	15	–
2. Chelsea Bridge - - - - - -	34,503	4	10
3. Chelsea Embankment and Street - -	26,289	8	6
4. Pimlico Improvements - - - - -	27,810	–	5
5. New Street, Spitalfields - - - -	12,000	–	–
TOTAL - - - £.	170,512	8	9

In the last paragraph but one of your report you state that you are confident that the sum to be realised by the sale of properties will exceed the contemplated grant of 170,512 *l.* 8 *s.* 9 *d.*, and leave a very considerable surplus towards repaying to the Exchequer Bill Loan Commissioners the sum of 200,000 *l.* advanced for Battersea Park; but, as these five improvements are all distinct undertakings, as the Acts under which they have been carried out will not allow of the funds and properties of any one being appropriated to another (except the Chelsea Bridge Embankment and Street), and as therefore each one must be kept distinct, I shall so treat them in the following remarks.

Battersea Park.

The present total expenditure, exclusive of liabilities, has been about 310,500 *l.*; the balance now in hand is about 2,000 *l.*; and the sum now required beyond this balance to discharge all liabilities for the enfranchisement of the copyhold for works, &c., may be about 8,000 *l.*; therefore I submit that the only sum required at the present time, in order to discharge the above-named liabilities, and to complete the five public roads, is about 10,500 *l.*, or it may be 16,000 *l.*, if my recommendation should be adopted of expending a further sum of 5,350 *l.* for raising the levels.

The expenditure to be made in future years (if the above sum of 10,500 *l.* or 16,000 *l.* should be now granted) would be for the Lodges, the Sewers, and the River Embankment. The current expenses of managing and letting the building lands will be paid out of the estate, which now produces a rental of above 3,000 *l.* per annum.

For building the Lodges a sum of 5,000 *l.* may be required; but I pass it over, having already recommended that they should be built progressively out of the annual votes, as in the Regent's Park, Victoria Park, and the other Parks.

For building Sewers no sum will be required for several years, nor can any estimate be now made for such uncertain works; indeed eventually none may be required; for my impression is, that all the sewers will be built under the provisions of the Local Management Act; that the main line will be a part of the great southern sewer, and that the secondary sewers will be built by the local Board to be paid for by annual rate upon the property.

For building the Embankment a sum of 35,000 *l.* may be eventually required; but in my report of March last, I recommended that, for the benefit of the park, this work should be postponed for at least two years, and I do so now. Whether it should or should not ever be carried out, must, I submit, be subject to future consideration with reference to the condition and requirements of the river.

Chelsea Bridge.

I am not in the slightest degree connected with the Bridge, or responsible for any estimate appertaining to it; but as in your report it is mixed up with the other improvements, I would take the liberty respectfully to observe, that there appears to me an error in the statement, No. 2, and that the sum really required to complete the work is not 34,503 *l.* 4 *s.* 10 *d.*, but 23,766 *l.* 2 *s.* 9 *d.* According to that statement, the total cost of the Bridge will be 94,266 *l.* 2 *s.* 9 *d.*; the total sums provided have been 70,500 *l.*, and the total deficiency therefore will be 23,766 *l.* 2 *s.* 9 *d.*

Whether this sum of 23,766 *l.* 2 *s.* 9 *d.* should be provided for by grant from Parliament, or whether it ought to be defrayed out of the surplus of the Embankment Fund, is hereinafter submitted for your consideration.

Chelsea Embankment and Street.

The portion of this improvement for which I am responsible is the street, and I believe that my estimate for that will not be exceeded.

According to the statement, No. 3, annexed to your report, the total sum provided for the embankment and street has been 145,753 *l.*, and the total expenditure 93,850 *l.* 12 *s.* 3 *d.*; and there now remains a sum in hand of 51,902 *l.* 7 *s.* 9 *d.* to complete the works.

The cost of completing the works up to the west end of Chelsea Hospital, is estimated at 26,289 *l.* 8 *s.* 6 *d.*, which being deducted from 51,902 *l.* 7 *s.* 9 *d.*, the cash in hand, will leave a surplus of 25,612 *l.* 19 *s.* 3 *d.*, after all the works have been completed; there will also be in hand property of the value of 20,000 *l.*, and there will be contributions due from proprietors, the amount of which is uncertain, but it will be considerable.

These three sums together may produce probably not less than 50,000 *l.*, which would have been applicable to the continuation of the embankment up to Cheyne Walk, but that such continuation cannot now be made without a fresh Act of Parliament; because the agreements referred to by the sixth section of the Act 16 & 17 Vict. c. 87, were not entered into; and also because the compulsory powers given by the second section of that Act have expired.

It is quite clear that with 51,902 *l.* 7 *s.* 9 *d.* in hand, it is unnecessary to apply for any grant for this improvement. Respecting the appropriation of the estimated surplus of not less than 50,000 *l.*, I would request your attention to the Act 9 & 10 Vict. c. 39, section III., whereby such surplus is directed to be applied, first in or towards any of the purposes of the said Act, and in the next place to maintaining and keeping in repair the said Bridge, &c.; as the building of the Suspension Bridge was one of the chief purposes of the Act, and as by the lapse of the powers to continue the embankment to Cheyne Walk, the sum named has become a surplus, I would suggest, whether under this section, such surplus ought not to be applied first to the completion of the Bridge and then to its maintenance.

The above-named surplus of 50,000 *l.* may be reduced by 15,000 *l.*, the monies advanced by the Exchequer Bill Loan Commissioners; but I am ignorant whether that loan has or has not been paid off, nor do I know on what security it was advanced.

Pimlico.

Regarding the sum of 27,810 *l.* stated to be required for this improvement, I have no observation to make beyond those already submitted in my several reports on the subject, which have been full and explicit.

New Street from Spitalfields to Shoreditch.

In your report, it is stated that 12,000 *l.* will be required for completing this improvement; but no credit has been allowed for the 7,394 *l.* 2 *s.* 4 *d.*, cash in hand on the 31st March last, as shown by Mr. Goodliffe's statement; and the sum required ought, as it appears to me, to have been stated at 4,605 *l.* 17 *s.* 8 *d.*, thus—

	£.	s.	d.	£.	s.	d.
Total expenditure to 31st March 1857 - - - - - -	218,697	18	3			
Cost of completing the Works -	12,000	–	–			
				230,679	18	3
Total receipt to 31st March 1857 - - - -				226,092	–	7
Deficiency - - - £.				4,605	17	8

I submit, however, that it is unnecessary to apply for a grant to cover the above deficiency; the Acts for the Improvement give power to raise money upon the lands and buildings purchased; the value of those properties is probably not less than 70,000 *l.*, they are at present mortgaged for only 20,000 *l.*; and as the street will almost immediately be paved and opened as a public thoroughfare, I apprehend there will not be any difficulty in obtaining so small a sum as 4,605 *l.* 17 *s.* 8 *d.*, if it should be required, which is not certain.

Summary.

By the preceding observations it has been my endeavour to show:

1st. That I have been anxious to facilitate your inquiries, and have not unnecessarily delayed any report.

2d. That I have no control of any kind over the funds; and that I am only the surveyor, having the management of the purchases, works, and relettings, under the superior direction and control of the Commissioners of Works.

3d. That my estimate for the street at Chelsea has not been exceeded; that the excess of expenditure above estimate, at Battersea and at Spitalfields, is not so large as stated in your report; and that I am not in any respect, or in either case, responsible for such excess, which has arisen entirely from the want of funds and the expenses and delays occasioned thereby.

4th. That it is not necessary to apply to Parliament for a grant of 170,512*l.* 8 *s.* 9 *d.*; that the only sums required this Session are 10,500 *l.* or 16,000 *l.* for Battersea Park, and 27,810 for the Pimlico Improvements; that no grants are or will be required for Chelsea Bridge, Chelsea Embankment, and the New Street, Spitalfields; that, as respects these three improvements, there will remain in hand considerable surplus monies and properties after the undertakings have been completed; and that the cost of Battersea Park to the public, when completed, will be less than the present value of the bare ground.

Fearing, as I have already said, that your report, without the observations I have now taken the liberty to make, is calculated to be injurious to my professional reputation, I most humbly request the favour of you to forward a copy of this letter to the Treasury, and also to move in the House of Commons that this letter may be printed.

I have, &c.

(signed) *James Pennethorne.*

The Right Hon. the First Commissioner
of Her Majesty's Treasury.

Sir, Office of Works, &c., 16 July 1857.

Your letter of the 11th instant, which was received late in the afternoon of that day (Saturday), was laid before the First Commissioner of Her Majesty's Works, &c., on Monday the 13th instant.

In the second paragraph of that letter you say, "In that report you particularly invite their Lordships' attention to the correspondence appended to it, carried on in great part with me, as exhibiting some of the difficulties you have had to encounter; this may not be intended to impute to me either unwillingness or delay in affording information, but I feel that the words may be construed as conveying such imputation, and, in fact, they have been so construed in more than one public paper."

In the report which was sent to the Lords of the Treasury, the First Commissioner directs me to say, that he desired to lay the whole matter to which it related before their Lordships, and he cannot be at all surprised if such constructions were put upon his statement to their Lordships as those which you apprehend they may bear. The facts of the case are simply these: As regards Battersea Park, a letter was addressed to you on the 15th January last, stating to the effect, that after a careful perusal by the First Commissioner of the report which you had previously presented to him, he could not arrive at any satisfactory conclusion as to what would be the ultimate cost of that work; he therefore desired further information on the subject. You took no notice of that letter till the 29th of January, when you stated, in your letter of that date, that if certain information was afforded you from this department you would be enabled, shortly afterwards, to comply with the instructions. Within 48 hours after the receipt of your letter, the information you required was furnished, viz., in the letter of 31st January. You took no notice whatever of that letter, and on the 17th February I was directed to call your immediate attention to it, and to request that you would furnish the information required by the First Commissioner with as little further delay as possible. No answer having been received from you, I was directed to write again on the 26th February, requesting you would immediately furnish the First Commissioner with a statement of the reasons of your not having sent him the information asked for, the want of which extremely inconvenienced him. You answered that letter on the same day, stating that you expected to be able to report fully on the subject of the park early in the next week; and on the 11th March, about two months after you were first required to make your report, and nearly six weeks after you received from this office the information which you stated was necessary to enable you to make it, you sent your report to the office.

That report was found to be incomplete, and the First Commissioner, by my letter to you of the 16th March, requested you to furnish him with certain additional information. As no reply was sent to this letter, I was directed by the first Commissioner, on the 28th March, to write to you again on the subject, and it was not until the 8th April that the information required by him was sent by you to the office.

As regards Chelsea Bridge and Chelsea Embankment, &c., a letter was addressed to you on the 7th May, merely requesting you would inform the First Commissioner if there were any outstanding claims on account of the new street, from Sloane-street to Chelsea Bridge, and if so, of their nature and amount. As you did not reply to that letter, I was directed by the First Commissioner to write to you again on the 19th May on the same subject; and your answer to those letters was not sent till the 23d May.

In regard to the Pimlico Improvements, the same delay occurred on your part. A letter was addressed to you on the 21st January requiring information upon the subject of those improvements, and that letter was not answered by you till 27th March, a delay of 65 days.

The correspondence in relation to the New Street from Spitalfields to Shoreditch shows similar delay on your part. A letter was addressed to you by the direction of the First Commissioner on 21st January, for certain information respecting this undertaking, and after waiting 27 days for a reply, I was directed, on the 17th February, to write to you again. No answer being received at the office, the First Commissioner directed me, on the 26th February, to write to you again, desiring you to furnish him with the information required, and stating that he was much inconvenienced by your not answering those letters. On the 27th February, after a delay of 37 days, you wrote to the First Commissioner, expressing your opinion that if further delayed, your report would be much more complete and satisfactory than it could then be made, as the purchase of the Wheeler estate and the arrangements respecting the sewer had not been completed.

On 2d March I was directed by the First Commissioner, in order that there might not be any ground of further delay, to request that you would forward to the First Commissioner the information already asked for; and to enable you to do so, you were desired to set down as sums for the completion of the purchase of the Wheeler estate and the cost of the construction of the sewer, the amounts which, with the information you were already possessed of, you might consider sufficient for those objects. No notice was taken by you of that letter, and after the First Commissioner had waited 58 days for an answer, he directed me, on the 29th April, to address another letter to you, requesting that you would furnish the information required as quickly as possible. You took no notice of that letter, and after a lapse of 10 days more, by the direction of the First Commissioner, another letter was sent you by me, dated 9th May, requesting an immediate report.

On the 11th May, you, for the first time, desired that the accountant of the department would furnish you with a detailed statement of the receipt and expenditure made up to that time; and you again submitted that the report would be more satisfactory if delayed for a further period of six weeks or two months. An immediate answer to that letter was sent to you, on the 13th May, to the effect that the accountant had been directed to furnish the statement required by you, and you were informed that it was requisite that you should make your report without delay. It was not till the 19th May that your report, which was in point of fact an answer to the letter addressed to you on the 21st January, was received.

I am further directed by the First Commissioner to remind you that on more than one occasion you were verbally requested to reply without unnecessary delay to the letters addressed to you by this office in the course of the correspondence above referred to.

The First Commissioner considers, therefore, that in making use of the word "difficulties," in his letter to the Treasury, he used the mildest expression he could select; and he desires me to add that, if you will refer to your correspondence with this office, you will find that the complaints in relation to delays on your part, in communicating information, have been numerous.

With regard to that portion of your letter in which you state that the excess of 111,065 *l.* 6*s.* 11*d.* in the case of Battersea Park, over the original estimate of 1847, and the excess of 20,467 *l.* 0*s.* 1*d.* in the case of the New Street, Shoreditch, over the original estimates of 1850 and 1852, appear to you to be incorrect, I am desired by the First Commissioner to direct your attention, in the first place, to the circumstance that the excess in each case is the difference of the expenditure and the estimate, as shown by your previous statements made to the Board.

With reference to Battersea Park, you more particularly allege, in effect, that the expenditure instead of reaching 376,999*l.* 2*s.* 10*d.*, the necessary expenditure to complete that undertaking according to your previous reports, need not exceed 325,000 *l.*, provided the embankment, which will cost 35,000 *l.*, and other works which will cost 15,350*l.*, are not executed, provided also certain fencing, which will cost 1,500 *l.*, is not charged to the expense of construction, but to that of maintenance of the park, and provided credit is taken for a sum of 4,500*l.* cash in hand at the time your statement was made up in the months of March and April last. There is no doubt that if the works about which the two first sums (amounting together to 50,350 *l.*), must be spent if executed, and if the third sum of 1,500 *l.* for fencing is transferred from the outlay of construction to that of maintenance, that the remainder of the works for constructing the park may be completed at a cost of 325,149 *l.* 2 *s.* 10*d.* (nearly the sum stated by you, viz. 325,000 *l.*); but if this course is pursued, the aggregate amount of these three sums must be deducted from the original estimate of 1847, in which the works to which they respectively relate are contemplated, and if so, the difference between that reduced estimate and the cost of its execution will remain as before, viz., 111,065 *l.* 6*s.* 11*d.*

With regard to the fourth sum, 4,500*l.*, cash in hand when your statement was made up, it is not perceived upon what principle that particular balance can go towards diminishing the excess of the cost of the undertaking over the estimate of 1847 as suggested by you. The works provided for by that estimate are not yet all carried out, but whenever they are carried out they will, unless portions of them are omitted, cost 376,999*l.* 2*s.* 10*d.* according to your own calculations, quite independently of balances in hand during their progress; and in the same manner the original estimate for the entire works will remain at 265,933*l.* 15*s.* 11 *d.* without being affected by any such balances.

As to the sum of 10,000*l.*, by which you state the estimate of 265,933 *l.* 15 *s.* 11 *d.* ought to be increased, owing to that sum having been paid for interest on borrowed monies, which item was specially excluded from the estimate of 1847, I am directed by the First Commissioner to say that he is at a loss to understand why that item was so excluded, as it was not at that time by any means probable that there would be any funds for constructing the park unless they were borrowed, and as an express power was introduced into the Act of 1846 to enable the department to raise 200,000 *l.* by loan for carrying on the works.

In your report of the 8th April last it appears that, for the completion of the embankment, it will cost 35,000 *l.* instead of 25,000 *l.*, the amount contained in the original estimate of 1847, adopted, as the First Commissioner infers from your letter, from Mr. Page's calculations. The First Commissioner is not sufficiently aware of the circumstances to form any opinion upon the propriety at the time of incorporating in the estimate of 1847 the embankment as projected by Mr. Page, although the result of that step is, that it is now found desirable to alter that embankment in certain respects, by which the cost will be enhanced by 10,000 *l.*

Whether your observations respecting these two sums of 10,000 *l.* and 10,000 *l.* are satisfactory or not, in showing that the portion of the excess in these respects of the cost of completing the park according to the estimate of 1847, the fact of the excess upon the whole undertaking being 111,065 *l.* 6 *s.* 11 *d.*, still remains unshaken by your remarks.

In the case of the excess of the ultimate cost of the Spitalfields improvement over the estimates of 1850 and 1852, of 20,476 *l.* 0 *s.* 1 *d.* (which is shown by your previous reports), you appear to think that that excess should be reduced by a balance in hand of 7,404 *l.* 2 *s.* 4 *d.* It has already been stated that it cannot be perceived upon what principle a balance in hand, during the progress of an undertaking, can affect in the manner proposed by you either the ultimate cost or the original Estimate. In the case under consideration the Estimate must still remain 210,230 *l.* 18 *s.* 2 *d.*, and the final cost of the undertaking (if your calculations are correct), 230,697 *l.* 18 *s.* 3 *d.*, that is to say, there will be an excess of expenditure over the Estimate of 20,467 *l.* 0 *s.* 1 *d.*

The sum stated by the First Commissioner, in his letter to the Treasury of 22d ultimo, as desirable to be granted for completing Battersea Park, is 69,909 *l.* 15 *s.*, and the sum stated by you as required at the present time to be advanced is 16,000 *l.* at the outside. The main difference between the two sums proposed apparently for a similar object, viz., that of completing the park, is obvious. The works proposed by you to be executed without delay, are a small portion only of those remaining to be performed of the estimate of 1847, whilst those proposed to be executed by the First Commissioner are the whole of the unexecuted works comprised in that estimate. The First Commissioner may not deem it necessary to press the immediate execution of the embankment, but whether it is proceeded with or postponed he would not have been dealing fairly with the Treasury if he had withheld from them the fact, that the embankment was comprised in the original estimate, and that in consequence of the expenditure which has taken place there are no funds for its construction. But as regards the erection of the lodges and other works necessary for completing the Park, he considers their immediate execution to be actually necessary; for, until it is completed, the value of the property to be sold or let in and outside the Park cannot reach the price most advantageous to the undertaking, and the full return from these sources will be proportionately postponed.

In the case of Chelsea Bridge, it is correct that 34,503 *l.* 11 *s.* 10 *d.* will not be required to be granted by Parliament for the completion of that work, but only 23,766 *l.* 2 *s.* 9 *d.* The error arose in the following manner: when the sum of 34,503 *l.* 11 *s.* 10 *d.* was inserted in the First Commissioner's letter to the Treasury, it represented the amount necessary to be expended, at the time of Mr. Page's report, to complete the entire undertaking, including all contingencies; and credit was not then given for a sum in hand of about 10,000 *l.* applicable to the completion. This omission, however, merely affects the amount of the grant now requisite to complete the undertaking; and has nothing to do with the amount of the excess of the ultimate expenditure over the original estimate, which you do not question.

The sum required as a grant for Chelsea embankment and street is also over-stated in the First Commissioner's letter to the Treasury, owing to a similar omission; and instead of 26,289 *l.* 8 *s.* 6 *d.* being required, a larger sum than 12,537 *l.* 0 *s.* 9 *d.* is not wanted for that purpose.

Instead of the balance in hand being 51,902 *l.* 7 *s.* 9 *d.*, as stated by you, it is 43,753 *l.* only, considerable payments having been made since the balance mentioned by you was calculated. Of this 43,753 *l.*, the sum of 38,150 *l.* is the portion of the original vote of 145,753 *l.* applicable to the portion of the embankment to the west of Chelsea Hospital, and cannot, in the opinion of the First Commissioner, without a breach of faith, be made use of for the other or eastern portion of the embankment. This being the case, the balance in hand applicable to the completion of the works between Vauxhall and Chelsea Hospital, is only 7,782 *l.*; and as these works will not be completed for less than 20,319 *l.*

20,319 *l.* 0 *s.* 9 *d.*, a grant for the difference is necessary. As already stated in the case of Chelsea Bridge, the question of the necessity of a grant being smaller than that proposed by the First Commissioner's letter to the Treasury, does not affect the question of the excess of the cost of the works, when completed, over the original estimate.

The power possessed by the Board to raise money for the Spitalfields Improvement, will render it unnecessary for them to apply to Parliament for a grant to supply the deficiency in the funds for this undertaking; and the First Commissioner had already, before the receipt of your letter, taken into consideration the means for raising the necessary funds by loan.

I am, &c.

James Pennethorne, Esq. (signed) *Alfred Austin*, Secretary.

Sir, 7, Whitehall-yard, 22 July 1857.

I HAVE the honour to acknowledge your letter of the 16th instant, in reply to mine of the 11th instant, and I beg leave to thank you for the attention paid to my letter, and for your promise to forward it to the Treasury, and to move that it be printed by the House of Commons.

My anxiety has always been to afford you the most ample information on every subject. The fulness of my reports is a proof; and I have not at any time occasioned unnecessary delay.

In my opinion, it would have been advisable to postpone the report on Battersea Park until after the completion of the works for the season. At Spitalfields, I desired to ascertain the exact expenditure before reporting on that improvement. As respected Pimlico, there was really no information to be given beyond what was contained in my reports made in 1855 and 1856; I was not aware of any purpose for which you desired to have those reports. The delay of two or three months would, I believed, have been practically unimportant; and my wish was to postpone them, as I from time to time informed you, that I might be enabled to report facts instead of estimates.

In again addressing you upon the subject of these improvements, I desire only, with your permission, respectfully to express my dissent from the conclusion at which you have arrived respecting the excess of expenditure over estimate at Battersea Park; and also to place on record more clearly my views respecting the necessity of applying to Parliament for grants of money for Chelsea Bridge and Chelsea Embankment.

First, as to Battersea Park:

With respect to your observations regarding the omission from my original estimate the item of "interest on borrowed monies," I beg leave to state that "interest" has never yet been included in any estimate furnished by me; the funds have always been under the control and management of the department; I have never been consulted on the borrowing of monies; and all my estimates have been made with reference only to purchases and works.

As to your observations respecting cash in hand, I would observe, that as this item was not in any case referred to in your report, it appeared necessary to bring it under your notice; it is a deduction from the required grants, although it does not affect the comparison of expenditure with estimate.

As respects your remarks that "the fact of the excess upon the whole undertaking being 111,065 *l.* 6 *s.* 11 *d.* still remains unshaken," I might perhaps be silent (though I do not agree with your figures), because it has been fully shown that I am not in any degree responsible for the excess; but I should like to place upon record that, comparing all the items comprised in my estimate of 1847, with the expenditure upon those items, the excess has been from 20,000 *l.* to 30,000 *l.* below the sum named by you.

As respects the amount of grant which it may be advisable to apply for, I understand from your letter that you propose to postpone the embankment for a time, but that you consider the erection of the lodges essential for the letting of the building-ground outside the Park; the completion of the Park and the building of the lodges may to a certain extent influence the letting of the building-ground; but I do not altogether participate in your views on this subject, and would still suggest 16,000 *l.* as an ample vote for the present year, that sum being intended to cover works to the amount of 6,000 *l.*, which I recommended to be done, though they are not absolutely necessary.

For the purpose of explaining more fully my views as to the amount of the ultimate total expenditure (including the embankment), and as to the result of a grant of 16,000 *l.* this year, I take the liberty to submit the two following statements:

STATEMENT, No. 1.—Respecting the Total Expenditure.

	£.	s.	d.	£.	s.	d.	£.	s.	d.
The Total Outlay, up to the 18th July 1857 - - - - - -							310,643	10	–
Estimated present Liabilities:									
Purchases not completed - -	1,816	–	–						
Contracts for Works, &c., about -	630	–	–						
Enfranchisement of Copyholds -	4,500	–	–						
Architect's Account - - -	2,631	–	–						
				9,577	–	–			
Estimate of Works recommended to be done in 1857-8:									
Completion of Five Public Roads -	2,500	–	–						
Raising Mounds, &c. - - -	5,350	–	–						
Forming Drives and Walks, and Planting - - - -	1,500	–	–						
Building a Culvert - - -	150	–	–						
				9,500	–	–			
Estimate of Works to be done in subsequent Years:									
Building Lodges - - -	5,000	–	–						
Embankment - - - - -	35,000	–	–						
				40,000	–	–			
							59,077	–	–
TOTAL Estimated Expenditure - - - £.							369,720	10	–

STATEMENT, No. 2.—Estimate of Funds available in the Year ending March 1858, assuming the Grant to be 16,000 *l.*

	£.	s.	d.	£.	s.	d.
Cash in hand, 18th July 1857 - - - - - -	1,949	–	–			
Estimate of rents receivable up to Lady-day 1858, after deducting rates, &c. - - - - - - - -	2,500	–	–			
Proposed grant of Parliament - - - - - -	16,000	–	–			
TOTAL Funds available to Lady-day 1858 - - - £.				20,449	–	–
Total liabilities, as per Statement, No. 1 - - - -	9,577	–	–			
Total works, 1857-58, as per ditto - - - -	9,500	–	–			
				19,077	–	–
Surplus to meet Contingencies and Expenses - - - £.				1,372	–	–

Secondly. As to a grant for Chelsea Bridge and Embankment.

These works belong more properly to Mr. Page than to myself; and as respects the funds, I am uninformed except by the abstract annexed to your report; but as all the improvements are blended together in that report, and as respecting this one in particular I ventured to make a suggestion which you think would involve a "breach of faith," I take the liberty to add a few words upon this subject.

The total sum voted for the embankment and street has been 145,753 *l.*; for this sum the embankment was to have been continued to Cheyne Walk, but that cannot now be done without a new Act of Parliament; consequently the sum of 38,150 *l.*, included in that sum as applicable to the western portion of the embankment, becomes available for the general purposes of the Act, and the suggestion I took the liberty to make to you respecting the surplus of this fund was founded upon the letter written by Mr. Russell on your behalf to myself, on the 4th of November last, in which he informed me that "the First Commissioner does not propose to continue the embankment westward of the hospital."

When the Act was passed in 1853, the possibility of the agreements not being entered into was foreseen; and therefore, as by the former Act, all surplus funds had been made applicable, first, to the completion of the bridge, and then to its future maintenance, I apprehend that the application of part of the surplus to the completion of the bridge, as directed by the Act, cannot be construed as a breach of faith; and from Mr. Russell's letter I concluded that such was your opinion.

The most advisable course to be now pursued would be (as I submit) to complete the embankment and the bridge with the funds in hand, and afterwards (when the amount of surplus shall have been thereby correctly ascertained) to submit the appropriation of the surplus monies and property (estimated together in the following statement at 33,970 *l.*) to the consideration of the Treasury or of Parliament, for a decision whether to apply such surplus to the western portion of the embankment, or to the future maintenance of the bridge.

The present state of the funds, and the mode in which I have suggested they should be applied, will be explained more clearly by the following statement, the figures of the first portion thereof being copied from your abstract; because although the funds in hand are now less than stated in that abstract, the future expenditure has been, by the payments, proportionately reduced.

The amount of contribution is founded on Mr. Page's Report of 21st April 1856, and the valuation of the building ground is my own.

				£.	*s.*	*d.*
The total sum voted for the embankment and street - - -				145,953	-	-
	£.	*s.*	*d.*			
Amount of expenditure when abstract was made	93,850	12	3			
Estimated then future expenditure - -	26,289	8	6			
				120,140	-	9
Surplus cash for completion of the bridge - - - - -				25,612	19	3
Estimated cost for completion of the bridge - - - - -				23,766	2	9
Surplus cash after completion of the bridge - - - - £.				1,846	16	6
Additional surplus, viz., contributions from the Marquis of Westminster and from the Chelsea Water Works Company, for their Leasehold under the Marquis of Westminster, say about - -				14,000	-	-
Estimated value of building ground, about - - - - - -				20,000	-	-
TOTAL Surplus, after the completion of the bridge, applicable to the maintenance of the bridge, or to the continuation of the embankment, which in 1852 was estimated at 38,150 *l.* - - - - - - - - - - £.				35,846	16	6

Before closing this letter and this correspondence, I would express a hope that I have not written with too great freedom, my only desire having been to give the fullest information and the best opinions I can form on each subject; but if you should think that I have been too forward, I would beg you to remember that though I am not the responsible party in these undertakings, yet my name has been brought forward as though I were. My reputation might thereby have suffered, and the more so perhaps as the first promoters of Battersea Park, and those under whom I first commenced the work have passed away, and I am the only person in the Office of Works left to explain the transactions, and am therefore the more liable to suffer from imputations.

I am, &c.
(signed) *James Pennethorne.*

The Right Hon. the First Commissioner
of Her Majesty's Works, &c.

Sir, Office of Works, &c. 25 July 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 22d instant, respecting the Metropolitan Improvements; and in reference to your further statement, as to the expenditure required for completing Battersea Park, the First Commissioner desires me to say, that it does not appear from that statement that any diminution in the amount necessary for completing the works comprised in the estimate of 1847, as originally stated by you, can be effected without the abandonment of a portion of those works.

With regard to your remarks respecting Chelsea Bridge and Embankment, in which you assume that the sum of 38,150 *l.* is applicable to the general purposes of the Act relating to Chelsea Embankment, the First Commissioner desires me to say that he cannot concur in that view, inasmuch as he is of opinion that he would not be justified in applying that sum towards completing the east end of that work. He has already fully informed you upon this point. With regard to the additional surplus of 14,000 *l.* to arise from contributions, and 20,000 *l.*, the estimated value of building ground referred to by you, the First Commissioner desires to observe, that in his Report to the Treasury of the 22d ultimo, he adverted to these contributions, and also to the fact that the vacant land in the north approach to the bridge would be at the disposal of this department after the completion of the works; but he is of opinion that, until the works shall have been completed, no accurate estimate can be made of the amount to be realised from these sources.

He desires me, however, to add, that the amount to be finally realised does not affect the present questions relating to the Bridge or the Embankment, which simply regard the excess of expenditure over the original estimate in both cases, and to the funds immediately required for their completion.

The First Commissioner will forward copy of your last letter and this reply to the Treasury.

I am, &c.
(signed) *Alfred Austin*,
Secretary.

James Pennethorne, Esq.

Office of Works, &c.
6 August 1857.

B. Hall,
First Commissioner of Her Majesty's Works
and Public Buildings.

METROPOLITAN IMPROVEMENTS.

COPY of LETTER from the FIRST COMMISSIONER of HER MAJESTY'S WORKS, &c. to the TREASURY, dated the 28th day of July, containing COPY of CORRESPONDENCE referred to in that Letter (in continuation of Parliamentary Paper, No. 180, of Session 1857).

(*Sir Benjamin Hall.*)

Ordered, by The House of Commons, *to be Printed,*
7 *August* 1857.

251.—Sess. 2. *Under* 2 *oz.*

NEW GOVERNMENT OFFICES.

RETURN to an Order of the Honourable The House of Commons,
dated 1 July 1857;—*for*,

COPY "of a LETTER, dated the 30th day of June 1857, addressed by the First Commissioner of Works, &c., to the Lords of Her Majesty's Treasury, containing the AWARD of the JUDGES appointed to report upon the DESIGNS for the PROPOSED NEW GOVERNMENT OFFICES."

To the Right Honourable the Lords Commissioners of Her Majesty's Treasury.

My Lords, Office of Works, &c., 30 June 1857.

IN my report to your Lordships of the 5th December last, I transmitted a copy of a Minute of what passed at an interview between the Chancellor of the Exchequer and myself on the 4th August preceding, respecting the course to be adopted in regard to the proposed new Government Offices at Westminster.

That Minute stated that the Chancellor of the Exchequer considered that I might obtain designs (which I suggested architects of all nations should be invited to send in) for laying out the surface of the whole site referred to in the Report of the Committee of the House of Commons on the subject, but that plans and elevations of buildings should only be required in respect of the Foreign Office, and the offices for the War Department, and that a sum not exceeding 5,000 *l.* might be expended in premiums to be awarded to the most successful of the competing architects for their respective designs.

I at the same time informed your Lordships of the steps which I had taken for obtaining these designs, and I transmitted copies of the printed specifications and ground plans which I had caused to be prepared and circulated for the information and guidance of competing architects.

On reference to those specifications and plans (of which I again enclose copies), your Lordships will see that the 20th March was the last day fixed for receiving designs from architects residing in this kingdom, and the 4th April from architects residing abroad.

Your Lordships will also see that the sum of 5000 *l.* proposed to be given as premiums for the most approved designs was to be apportioned as follows, viz.:—

DESIGN No. 1.

BLOCK PLAN.

First premium	£. 500
Second "	200
Third "	100

DESIGN No. 2.

FOREIGN DEPARTMENT.

First premium	£. 800
Second "	500
Third "	300
Fourth "	200
Fifth "	100 each.
Sixth "	
Seventh "	

Design No. 3.

WAR DEPARTMENT.

First premium	£. 800
Second "	500
Third "	300
Fourth "	200
Fifth "	100 each.
Sixth "	
Seventh "	

Designs were sent in by about 218 competitors, and were subsequently, as your Lordships are aware, exhibited to the public in Westminster Hall.

The following noblemen and gentlemen were, at my request, good enough to undertake the task of acting as judges of the respective merits of the designs, viz.:

His Grace the Duke of Buccleuch.

Earl Stanhope.

Viscount Eversley.

Mr. Stirling, M.P.

Mr. Brunel, C.E.

Mr. D. Roberts, R.A.

Mr. Burn, Architect.

As soon as they had commenced their labours, I addressed to them the following letter, enclosing at the same time the Parliamentary Paper referred to therein.

My Lord Duke, Office of Works, &c. 16 May 1857.

I enclose a copy of the Report of a Committee of the House of Commons upon Westminster Bridge. Your Grace will observe by the paragraph which I have marked, that the Committee recommended "the suspension of the "works upon the new bridge until the Government should have had the "opportunity of considering and deciding on the advice to be offered to "Parliament upon that subject, when the site of the new bridge might be "reconsidered in connexion with any general plan of alteration and improvement of the neighbourhood, as well as the all-important subject of the "headway under the bridge."

Your Grace will also observe by reference to the instructions to competitors contained in the specifications sent out, that the block plan was to represent any improvement which the author might suggest with reference to the situation of the new bridge, the ultimate position of which must be considered in connexion with the design.

I mention these facts for the consideration of the committee appointed to judge of the plans of public offices.

I am, &c.

His Grace the Duke of Buccleuch. (signed) *B. Hall.*

I now forward to your Lordships a copy of the award of the judges which was delivered to me yesterday evening, and I shall be glad to receive your Lordships' instructions to pay the premiums to which the successful competitors are entitled, for which no provision has been made in the Estimates of this department.

I have opened the envelopes which bear the mottoes affixed to the successful designs, and have inserted the names of the authors in the award.

I am, &c.
(signed) *B. Hall.*

NEW GOVERNMENT OFFICES.

Office of Works, Whitehall, London,
30 September 1856.

The Commissioners of Her Majesty's Works and Public Buildings give notice, that they are prepared to receive three designs from architects of all countries: the first, to comprise a scheme for the concentration of the principal Government Offices on a site lying between Whitehall and the New Palace at Westminster; the other two, designs for buildings which Her Majesty's Government have determined to erect forthwith as parts of such scheme, one for the Department of the Secretary of State for Foreign Affairs; and the other for the Secretary of State for War.

Design No. 1.

GENERAL, OR BLOCK PLAN.

This design is to show, by a Block Plan, the best mode of concentrating the principal Government Offices on a site comprised within the space bounded by a red line, on the accompanying Plan, No. 1, including the space tinted blue, to be obtained by the proposed embankment of the River Thames.

The design is also to represent any improvements which the author may suggest in the principal approaches to the New Palace at Westminster, as well as in the communications with the Surrey side of the River Thames, especially with reference to the situation of the New Westminster Bridge, the ultimate position of which must be considered in connection with this design. The accompanying Plan No. 2, compiled from the Ordnance Survey, shows the River Thames, the leading thoroughfares, and the principal public buildings in the vicinity of the site.

The design for the Block Plan must be drawn to the same scale as the Plan No. 1, namely, 44 feet to an inch; and the proposed improvements of the leading thoroughfares, &c., to the scale of Plan No. 2, namely five feet to one statute mile. The Government Buildings, or any of them now standing on the site, may form a part of the general plan to be submitted by any architect, if he should consider them available for that purpose.

The Government have determined that the buildings for the Departments of the Secretary of State for Foreign Affairs, and the Secretary of State for War, shall be erected upon the part of the site tinted yellow on the plans, and that the Foreign Office shall be next the Park: architects must therefore design the general plan in accordance with that arrangement.

Architects desiring to send in models with this design will be permitted to do so, provided the models are made to the same scales as the design; but drawings in frames (other than straining frames) and glasses will not be received.

Any alteration in the existing levels of the streets must be shown upon the drawings and models.

The following is a list of the principal Government Offices, with the approximate area required for each:

	Approximate Superficial Area in Feet.
The Treasury, including Official Residences for the First Lord and for the Chancellor of the Exchequer	50,000
The Foreign Office, including an Official Residence	46,000
The War Department	50,000
The Colonial Office	15,000
The Home Office	15,000
The Paymaster General's Office	15,000
The Exchequer Offices	3,000
The Board of Trade	25,000
The Privy Council Office	15,000
The Admiralty, Somerset House	45,000
The Board of Control	12,000
The Poor Law Board	10,000
The State Paper Office	5,000
The Office of Works	8,000
The Office of Woods	8,000
Civil Service Commission, &c.	5,000
The Charity Commission, &c.	6,000
The Ecclesiastical Commission	6,000
Copyhold, Inclosure, and Tithe Commission	8,000
The Emigration Office	5,000

Architects must, in addition to the offices above enumerated, provide for further buildings (to be afterwards appropriated as the Government may determine) to such an extent as may be consistent with proper open spaces and thoroughfares.

DESIGN No. 2.

DEPARTMENT OF THE SECRETARY OF STATE FOR FOREIGN AFFAIRS.

This design is to comprise a public office and an official residence for the Secretary of State for Foreign Affairs, to be erected on the west portion of the ground tinted yellow, on Plan No. 1.

The drawings are to show a plan of each floor, longitudinal and transverse sections, and elevations drawn to a scale of 16 feet to an inch.

Architects are also to send in an elevation of one of the principal fronts drawn to a scale of eight feet to an inch; and they will be at liberty to send in enlarged details of portions of the designs to a scale of four feet to an inch.

The plans and sections are to have the sizes and heights of the rooms figured thereon, and are to be tinted in light brown Indian ink; the elevations are to be in line only.

One perspective view, tinted with light brown Indian ink, may accompany the designs; but models, bird's-eye perspective views, and drawings in frames (other than straining frames) and glasses, will not be received.

General specifications of the materials proposed to be used in the building must accompany the design.

The following is the accommodation required for this department:—

BASEMENT FLOOR.

PRINTER.

1	Room for 25 compositors		50 feet	by	20 feet.
1	Room for three hand presses		35	„	20 „
1	Room for the reader		18	„	16 „
2	Rooms for the master printer	each	18	„	16 „
1	Room for stores, type, paper, &c.		40	„	20 „

The above rooms to be entered from the area, and to have no communication with the upper part of the building, except by a private staircase from the reader's room to the ground floor.

Bookbinder.

1 Room for the master bookbinder	18 feet by 16 feet.
Store rooms for papers and rooms for workmen	120 „ 30 „

These rooms should be under the Library on the ground floor, and communicate therewith; and also with the second Library on the second floor.

Housekeeper.

2 Sitting-rooms, kitchen, scullery, pantry, store-rooms, cleaning room, and other conveniences.

A staircase from the basement to the second floor, for the exclusive use of the housekeeper and female servants.

Principal Office Messenger.

1 Living-room	16 feet by 16 feet.
2 Bed-rooms	each 16 „ 16 „

A small kitchen, scullery, and other conveniences.

Assistant Office Messenger.

The same accommodation as the principal office messenger.

Head Porter.

1 Living-room	16 feet by 16 feet.
2 Bed-rooms	each 16 „ 16 „

A small kitchen, scullery, and other conveniences.

Under Porter.

The same accommodation as the head porter.

Lamplighter.

1 Living-room	16 feet by 16 feet.
1 Work-room	16 „ 16 „
1 Store-room	16 „ 16 „
1 Bed-room	16 „ 16 „

There should be a separate staircase from the basement to the hall for the use of the office messengers, the porters, and the lamplighter.

Cellars for coals, wood, beer, &c.

Boiler-house, and space for warming apparatus.

There should be a commodious and wide staircase (say about 20 feet square), in addition to those already described, from the basement to the second floor, communicating with each floor, and having an entrance from the Park, and an easy access to the rooms of the Secretary and Under Secretaries of State.

GROUND-FLOOR.

Spacious outer and inner halls, and a principal staircase to the first-floor.

Passports.

1 Waiting-room	45 feet by 25 feet.
2 Rooms for clerks	each 20 „ 20 „

The waiting-room to be entered from the outer hall, and to communicate with the clerks' rooms; and the clerks' rooms should communicate with those occupied by the chief clerk's clerks.

Chief Clerk, Adjoining Passport Clerks.

1 Room	30 feet by 25 feet.
3 Rooms	each 20 „ 18 „

Agency Business.

1 Room	30 feet by 25 feet.

Messengers, &c.

1 Room adjoining the outer hall for foreign messengers (with retiring-room and water-closet)	20 feet by 20 feet.
1 Room for the home messengers	30 „ 20 „
1 Room for the office-keeper	30 „ 20 „
1 Room for office messenger	20 „ 20 „

(These three rooms to be entered from the inner hall.)

Library.

The Library is to consist of three rooms, 30 feet in width, and respectively 20, 30, and 70 feet in length	120 feet by 30 feet.

Translator.

1 Room	20 feet by 20 feet.

Slave Trade, and Treaty Department.

(Six Rooms).

1 Room (With retiring-room and water-closet.)	30 feet by 25 feet.
And on each side two rooms	each 30 „ 25 „

Telegraph.

1 Room for the clerk	18 feet by 16 feet.
1 Small room for instruments.	

General Waiting-Room.

1 Room	30 feet by 20 feet.

FIRST FLOOR.

THE SECRETARY OF STATE.

1 Room (With retiring-room and water-closet.)	35 feet by 25 feet.
1 Waiting-room	20 „ 18 „
2 Rooms for Private Secretaries	one 25 „ 20 „ one 20 „ 18 „
1 Cabinet-room	35 „ 25 „
1 Ante-room (With retiring-room and water-closet.)	20 „ 20 „
Foreign Ministers' waiting-room (With retiring-room and water-closet.)	35 „ 20 „
Waiting-room for office-keeper, with lift communicating with Home Service messengers' room	20 „ 20 „

UNDER

UNDER SECRETARIES OF STATE.

PERMANENT UNDER SECRETARY.

(8 Rooms.)

1 Room (With retiring-room and water-closet.)	30 feet by 25 feet.
And on one side, two rooms, one 30 feet by 25 feet, the other	30 „ 30 „
And on the other side four rooms; two, each 30 feet by 25 feet, and two each	30 „ 30 „

PARLIAMENTARY UNDER SECRETARY.

(6 Rooms.)

1 Room (With retiring-room and water-closet.)	30 feet by 25 feet.
And on each side two rooms, one 30 feet by 25 feet, the other	30 „ 30 „

The rooms appropriated to the two Under Secretaries should be, as far as practicable, contiguous to those of the Secretary of State.

CONSULATE DEPARTMENT.

1 Room	35 feet by 25 feet.
3 Rooms	each 20 „ 20 „
1 Conference-room	35 „ 25 „
1 Room	25 „ 25 „
1 Room (With retiring-room and water-closet.)	20 „ 20 „
1 Waiting-room	30 feet by 20 feet.

SECOND FLOOR.

A Second library over the library on the ground floor - 120 feet by 30 feet.

Spare rooms, distributed on a similar system to those appropriated to the Slave Trade and Treaty Department.

Accommodation for two resident clerks, consisting of a good sitting-room and bed-room, and one servant's bed-room for each; and a kitchen, with the necessary appurtenances, common to both.

Accommodation for the housekeeper, consisting of one sitting-room and three bed-rooms, and also three large bed-rooms for female servants.

Accommodation for the office-keeper, consisting of one sitting-room, two bed-rooms, a kitchen, and other conveniences.

Suitable arrangements should be made for water-closets, &c., in every part of the building.

The dimensions of the several rooms may be varied, provided the superficial area of each is not materially altered.

The building to be fire-proof, the rooms lofty, and the corridors wide.

OFFICIAL RESIDENCE FOR THE SECRETARY OF STATE FOR FOREIGN AFFAIRS, CONTIGUOUS TO THE FOREIGN OFFICE.

One state dining-room to accommodate 50 persons, with apartments adjoining for occasional supper and tea-rooms, library, morning-room, &c.

Five reception-rooms, en suite, on the first-floor, to accommodate 1,500 visitors.

One or more principal staircases to and from the reception-rooms.

About 12 or 14 bed-rooms, with a suitable number of dressing-rooms.

All the other requirements of a nobleman's town house.

Design No. 3.

DEPARTMENT FOR THE SECRETARY OF STATE FOR WAR.

It is intended to erect the building for the use of this department, on the east portion of the ground tinted yellow, on Plan No. 1.

The drawings are to show a plan of each floor, longitudinal and transverse sections, and elevations drawn to a scale of 16 feet to an inch.

Architects are also to send in an elevation of one of the principal fronts drawn to a scale of 8 feet to an inch; and they will be at liberty to send in enlarged details of portions of the designs to a scale of 4 feet to an inch.

The plans and sections are to have the sizes and heights of the rooms figured thereon, and are to be tinted in light brown Indian ink; the elevations are to be in line only.

One perspective view, tinted with light brown Indian ink, may accompany the designs; but models, birds'-eye perspective views, and drawings in frames (other than straining frames) and glasses, will not be received.

General specifications of the materials proposed to be used in the building, must accompany the designs.

The following is the accommodation required for this department:—

BASEMENT FLOOR.

Printer.

1 Room for 10 compositors	30 feet	by	20 feet.
1 Room for hand presses	25 „		20 „
1 Room for reader	18 „		16 „
1 Room for master printer	18 „		16 „
1 Room for stores, type, &c.	28 „		20 „

These rooms to be entered from the area, and to have no communication with the upper part of the building, except by a private staircase from the reader's room to the ground floor.

Bookbinder.

1 Room for the master bookbinder	18 feet	by	16 feet.
1 Room for workmen	30 „		20 „

Principal Office Messenger.

1 Living-room	16 feet	by	16 feet.
2 Bed-rooms	each 16 „		16 „

A small kitchen, scullery, and other conveniences.

Assistant Office Messenger.

The same accommodation as the principal office messenger.

Housekeeper.

HOUSEKEEPER.

Two sitting-rooms, large kitchen, scullery, pantry, store-rooms, cleaning-room, and other conveniences.

A Staircase from the basement to the second floor, for the exclusive use of the housekeeper and female servants.

COMMON DINING ROOMS.

2 Rooms - - - - - -	each 40 feet by 20 feet.

PORTER.

1 Living-room - - - - - -	16 feet by 16 feet.
2 Bed-rooms - - - - -	each 16 „ 16 „

A small kitchen, scullery, and other conveniences.

LAMPLIGHTER.

1 Living-room - - - - - -	16 feet by 16 feet.
1 Work-room - - - - - -	16 „ 16 „
1 Store-room - - - - - -	16 „ 16 „
1 Bed-room - - - - - -	16 „ 16 „

There should be a separate staircase from the basement to the hall for the use of the office messengers, the porter, and the lamplighter.

The remainder of the basement story to be appropriated as depositories for papers, maps, books, &c.

Boiler-house, and space for warming apparatus.

Cellars for coals, wood, beer, &c.

Two or more commodious staircases, for general use, from the basement to the second floor.

GROUND FLOOR.

Spacious outer and inner halls, and principal staircase to the first floor.

SURVEYOR'S DEPARTMENT.

2 Rooms - - - - - -	each 20 feet by 20 feet.
2 Rooms for draughtsmen - -	each 30 „ 20 „
1 Room - - - - - - - -	20 „ 20 „

INSPECTOR-GENERAL OF FORTIFICATIONS.

1 Room - - - - - - - -	20 feet by 20 feet.
1 Room for aide-de-camp - - - -	18 „ 16 „
1 Waiting-room - - - - -	16 „ 16 „

DEPUTY INSPECTORS'-GENERAL.

2 Rooms - - - - - -	each 20 feet by 20 feet.
1 Room for assistant - - - - -	18 „ 16 „
1 Room for chief clerk - - - -	18 „ 16 „
6 Rooms for clerks - - - -	each 30 „ 20 „
1 Room for maps and papers - -	35 „ 25 „
1 Waiting-room - - - - -	18 „ 16 „

DIRECTOR-GENERAL OF ARTILLERY.

1 Room - - - - - - - -	18 feet by 16 feet.
1 Room for chief clerk - - - -	18 „ 16 „
1 Room for clerks - - - - -	30 „ 20 „

NAVAL DIRECTOR-GENERAL OF ARTILLERY.

1 Room		18 feet by 16 feet.
1 Room for clerk		16 „ 16 „

DIRECTOR-GENERAL OF CLOTHING.

1 Room		18 feet by 16 feet.
1 Room for assistant		18 „ 16 „
1 Room for chief clerk		18 „ 16 „
3 Rooms for clerks	each	30 „ 20 „
1 Pattern-room		25 „ 20 „
1 Waiting-room		18 „ 16 „

DIRECTOR-GENERAL, ARMY MEDICAL DEPARTMENT.

1 Board-room		30 feet by 20 feet.
1 Room		18 „ 16 „
1 Room for chief clerk		18 „ 16 „
3 Rooms for clerks	each	30 „ 20 „
2 Rooms for professional assistants	each	18 „ 16 „
1 Waiting-room		18 „ 16 „

DIRECTOR-GENERAL OF STORES.

1 Room		18 feet by 16 feet.
1 Room for chief clerk		18 „ 16 „
10 Rooms for clerks	each	30 „ 20 „
1 Waiting-room		18 „ 16 „

MILITARY SUPERINTENDENT OF PENSIONERS.

1 Room		18 feet by 16 feet
1 Room for assistant		18 „ 16 „
1 Room for chief clerk		18 „ 16 „
2 Rooms for clerks	each	25 „ 20 „
1 Waiting-room		18 „ 16 „

TELEGRAPH.

1 Room for clerk		18 feet by 16 feet.
1 Small room for instruments.		
1 General waiting-room		30 feet by 20 feet.
2 Messengers' rooms	each	20 „ 18 „

FIRST FLOOR.

THE SECRETARY OF STATE.

1 Room (With retiring-room and water-closet.)		35 feet by 25 feet.
2 Rooms for private secretaries	each	18 „ 16 „
2 Waiting-rooms	each	18 „ 16 „
A cabinet-room and library		50 „ 30 „

CLERK OF THE ORDNANCE.

1 Room		25 feet by 20 feet.
1 Room for private secretary		18 „ 16 „
1 Waiting-room		18 „ 16 „

UNDER SECRETARIES OF STATE.

2 Rooms	each	25 feet by 20 feet.
2 Rooms for private secretaries	each	18 „ 16 „
1 Waiting-room		18 „ 16 „

DEPUTY

Deputy Secretary at War.

1 Room		25 feet by 20 feet.
1 Room for private secretary		18 „ 16 „
1 Waiting-room		18 „ 16 „

Director-General of Contracts.

1 Room		18 feet by 16 feet.
1 Room for chief clerk		18 „ 60 „
3 Rooms for clerks	each	30 „ 2 „
1 Waiting-room		18 „ 16 „

Principal Clerks.

1 Room		25 feet by 20 feet.
3 Rooms	each	20 „ 20 „
6 Rooms for clerks	each	30 „ 20 „
2 Rooms for registry	each	50 „ 30 „
1 Waiting-room		18 „ 16 „

First Clerk.

1 Room		30 feet by 20 feet.
6 Rooms for clerks	each	30 „ 20 „
1 Waiting-room		18 „ 16 „

Solicitor.

1 Room		18 feet by 16 feet.
1 Room for chief clerk		18 „ 16 „
2 Rooms for clerks	each	30 „ 20 „
1 Waiting-room		18 „ 16 „

Judge-Advocate General.

1 Room		25 feet by 20 feet.
1 Room for deputy		20 „ 20 „
1 Room for chief clerk		20 „ 20 „
1 Room for clerks		25 „ 20 „
1 Waiting-room		18 „ 16 „

Chaplain-General.

1 Room		18 feet by 16 feet.
1 Room for chief clerk		18 „ 16 „
1 Room for clerks		30 „ 20 „
1 Waiting-room		18 „ 16 „

Queen's Messengers.

2 Rooms (With retiring-room and water-closet.)	each	18 feet by 16 feet.
General waiting-room		30 „ 20 „
Messengers' room		30 „ 20 „

SECOND FLOOR.

Director-General of the Commissariat.

1 Room		18 feet by 16 feet.
1 Room for chief clerk		18 „ 16 „
8 Rooms for clerks	each	30 „ 20 „
1 Waiting-room		18 „ 16 „

ACCOUNTANT-GENERAL.

1	Room		18 feet	by	16 feet.
1	Room for chief clerk		18	„	16	„
1	Room for examiner of army accounts		18	„	16	„
1	Room for chief clerk		18	„	16	„
30	Rooms for clerks	each	30	„	20	„
1	Waiting-room		18	„	16	„

TOPOGRAPHICAL DEPARTMENT.

2	Rooms	each	20 feet	by	20 feet.
1	Room for maps and plans		35	„	20	„

Accommodation for the housekeeper; consisting of one sitting-room and three bed-rooms, and also three large bed-rooms for female servants.

Accommodation for the office-keeper, consisting of one sitting room, two bed-rooms, one servant's bed-room, a kitchen, and other conveniences.

Suitable arrangements should be made for water-closets, &c., in every part of the building.

The dimensions of the several rooms may be varied, provided the superficial area of each is not materially altered.

The building to be fire-proof, the rooms lofty, and the corridors wide.

PREMIUMS.

The following Premiums will be given for the most approved Designs:

DESIGN No. 1.
(BLOCK PLAN.)

	£.
First Premium	500
Second „	200
Third „	100

DESIGN No. 2.
(FOREIGN DEPARTMENT.)

	£.
First Premium	800
Second „	500
Third „	300
Fourth „	200
Fifth „	100 each.
Sixth „	
Seventh „	

DESIGN No. 3.
(WAR DEPARTMENT.)

	£.
First Premium	800
Second „	500
Third „	300
Fourth „	200
Fifth „	100 each.
Sixth „	
Seventh „	

If the architect to whom a premium may be awarded in respect of Designs No. II. and III., or either of them, shall be employed to superintend the execution of the work, he will not be entitled to receive such premium, but he will be paid a commission, at the rate of five per cent. upon the outlay. Such commission to include all expenses for measuring, superintendence, &c., except the salaries to clerks of works.

The designs in respect of which premiums may be given, are thereupon to become the property of the Government.

The designs are to be addressed to the First Commissioner, and delivered (carriage free) between the 1st and 20th (inclusive) of March,* 1857, at Westminster Hall, where it is intended they shall be publicly exhibited.

Every design sent in is to be inscribed with a motto; and an envelope, with the same motto on the outside, containing the name and address of the competitor, is to be sent to the First Commissioner of Her Majesty's Works and Public Buildings, Whitehall, London.

The Commissioners will not be answerable for any damage or accident that may happen to the drawings or models.

By Order of the Commissioners,
Alfred Austin, Secretary.

NEW GOVERNMENT OFFICES.

REPORT of the Judges appointed to consider the Designs for a Scheme for concentrating the principal Government Offices, and the Designs for a New Foreign Office with an Official Residence, and for a New War Office.

To the Right Honourable Sir *Benjamin Hall*, Bart., First Commissioner of Her Majesty's Works and Public Buildings.

Sir,

WE have the honour to transmit to you herewith the list of the designs to which we recommend the several premiums to be awarded.

BLOCK PLAN.

(Design No. 1.)

Premiums.	Numbers in the Exhibition.	Motto.	Name and Address.
1	12	"A. C." - - - -	M. A. Crepinet, Grand rue à Vaugirard, Paris.
2	189	"Corso" - - - -	Wm. Hastings, Esq., C.E., 2, Mount Pottinger, Belfast, Ireland.
3	128	"Confido" - - - -	Messrs. Morgan & Phipson, 3, Danes Inn, St. Clement's, Strand.

FOREIGN

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* An extension of time to the 4th April was granted to artists residing abroad.

FOREIGN DEPARTMENT.

(Design No. 2.)

Premiums.	Numbers in the Exhibition.	Motto.	Name and Address.
1	94	"Utilitas" - - - -	H. E. Coe, Esq., and Henry H. Hofland, Esq., 8, Danes Inn, Strand.
2	58	"Opera 81" - - - -	Messrs. Banks & Barry, 27, Sackville-street, London.
3	116 *a*	"Nec minimum, &c." - -	George Gilbert Scott, Esq., 20, Spring Gardens, London.
4	35	"Thou hast covered my head, &c."	Messrs. Deane & Woodward, Merrion-street, Dublin, and 88, St. James's-street, London.
5	17	"B. Z." - - - -	Thomas Bellamy, Esq., 8, Charlotte-street, Bedford-square.
6	54	"Suaviter Fortiter" - -	Charles Buxton, Esq., 7, Grosvenor-crescent, Belgravia, and Wm. G. & E. Habershon, 38, Bloomsbury-square, London.
7	129	"A vaillants cœurs, &c. - -	George Edmund Street, Esq., F. S. A. 33, Montague-place, Bedford-square, London.

WAR DEPARTMENT.

(Design No. 3.)

Premiums.	Numbers in the Exhibition.	Motto.	Name and Address.
1	77	"Fortiter et fideliter" - -	Henry B. Garling, Esq., 11, King's Road, Gray's Inn, London.
2	75	"Deus atque jus" - - -	M. A. Botrel d'Hazeville, 33, Rue du Nord, Paris.
3	61	"Anglo Saxon" - - -	J. T. Rochead, Esq., Glasgow.
4	140	"Cymru" - - - -	Messrs. Prichard & Seddon, Llandaff.
5	20	"Corona" - - - -	Cuthbert Brodrick, Esq., 17, East Parade, Leeds, and Quay-street Chambers, Hull.
6	54 *a*	"Au bon droit" - - -	Messrs. Wm. G. & E. Habershon, 38, Bloomsbury-square, London.
7	126	"Westminster" - - -	John Dwyer, Esq., 11, Great Marlboro'-street, W.

No. 5, 6, 7, in Designs Nos. 2 and 3, being entitled to premiums of equal value, are placed according to their numbers in the Exhibition, without regard to relative merit.

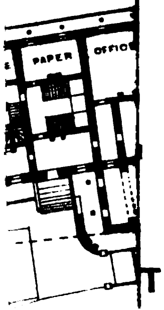
In making these recommendations we desire to observe, in the first place, that we were not in possession of any knowledge as to the sum which Her Majesty's Government might propose to the House of Commons to expend upon these works. The designs before us were unaccompanied by estimates, and did not admit of any accurate calculation with regard to their probable cost.

In examining the designs, which are 218 in number, and which embrace nearly 2,000 drawings, our first object was to ascertain how far those competitors, whom we deemed most worthy of notice, had or had not sufficiently complied with the instructions issued by Her Majesty's Government.

In this detailed examination we obtained, through you, the assistance of two gentlemen of great experience and of high professional character, namely, Mr. Angell and Mr. Pownall, and we are anxious to bear our testimony to the valuable services of these gentlemen.

Of the block plans we desire to remark, that we would not be supposed to approve of all the extensive alterations and demolitions recommended in the selected designs, which we nevertheless believe to contain many valuable suggestions.

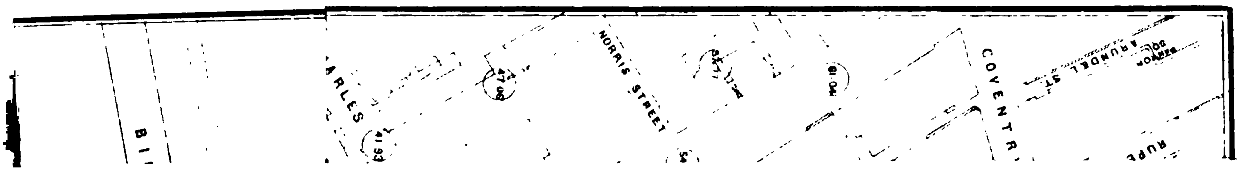
With regard to the designs for the Foreign and War Departments, a difficulty presented itself in consequence of several of the competitors having sent in designs



OFFICES, LONDON.

TING BUILDINGS & THOROUGHFARES.

PAPER —— NEW GOVERNMENT OFFICES.



designs combining, in one building, more or less unfitted for subdivision, both the public offices for which distinct prizes have to be awarded, whilst others have either confined their efforts to one of the buildings, or have given separate designs for each.

It will be evident that these united designs compete under considerable disadvantage with the single designs, and that unless a united design should be superior in both departments to all its single competitors, it could not receive a prize because one portion of it could hardly be executed without the other.

We have been obliged to meet this difficulty by treating the lower prizes as marks of distinction for merit rather than as indicating special selection of the design as fitted for separate construction.

We desire to express our great admiration of the unprecedented collection of designs submitted to us; of the artistic genius, manual skill, and patient labour which have combined to produce it, as well as of the eminent ability which so many of the competitors have displayed in dealing with internal arrangement, and in adapting the required accommodation to a definite area of ground, and to record our opinion that the collection reflects the highest credit upon the architects, Foreign and English, who have so liberally responded to your appeal.

We cannot conclude this Report without expressing our regret at the loss of the assistance of our colleague and chairman, the Duke of Buccleuch, who, being unexpectedly called away from London by business of pressing importance, was compelled to resign his seat amongst us at our second meeting; and almost at the close, when, as we believed, only one more day would be required to complete our task, a domestic calamity of the most grievous kind befel our colleague, Lord Eversley, and deprived us of his most valuable co-operation in our final awards.

(signed) *Stanhope,*
William Stirling,
David Roberts,
I. K. Brunel,
William Burn.

London, 27 June 1857.

Office of Works, &c.
30 June 1857.

B. Hall,
First Commissioner.

DESIGNS FOR NEW GOVERNMENT OFFICES.

COPY of a LETTER, dated 30 June 1857, addressed by the First Commissioner of Works, &c., to the Lords of Her Majesty's Treasury, containing the AWARD of the JUDGES appointed to Report upon the DESIGNS for the PROPOSED NEW GOVERNMENT OFFICES.

(*Sir Benjamin Hall.*)

Ordered, by The House of Commons, *to be Printed,*
2 *July* 1857.

[*Price* 2 *s.*]

152—Sess. 2.

Under 4 *oz.*

NUISANCES REMOVAL ACT.

RETURN to an Address of the Honourable The House of Commons,
dated 22 July 1856;—*for*,

A "RETURN stating which of the undermentioned LOCAL AUTHORITIES is acting for each PARISH in *England* under the Provisions of the NUISANCES REMOVAL ACT, and specifying the Parishes for which a SANITARY INSPECTOR has been appointed:—1. Local Board of Health; 2. Town Council; 3. Improvement Commissioners or Trustees; 4. Highway Board; 5. Nuisances Removal Committee; 6. Inspectors for Lighting and Watching; 7. Guardians and Overseers of the Poor and Surveyors of the Highways for the Parish or Place."

(*Mr. Cowper.*)

Ordered, by The House of Commons, *to be Printed*,
15 *May* 1857.

36—Sess. 2.

COUNTY.	Population of Unions in 1851.	Number of Parishes in Unions.	Number that have furnished Returns.	1.	2.	3.	4.	5.	6.	7.	Has a Sanitary Inspector been appointed under the Act?	SANITARY INSPECTOR APPOINTED BY							
				Local Board of Health.	Town Council.	Improvement Commissioners or Trustees.	Highway Board.	Nuisances Removal Committee.	Inspectors of Lighting and Watching.	Guardians, Overseers of the Poor, and Surveyors of the Highways.		1. Local Board of Health.	2. Town Council.	3. Improvement Commissioners or Trustees.	4. Highway Board.	5. Nuisances Removal Committee.	6. Inspectors of Lighting and Watching.	7. Guardians, Overseers of the Poor, and Surveyors of the Highways.	TOTAL.
Surrey - - -	196,348	139	100	3	2	—	2	14	2	57	28	2	1	—	2	6	2	10	23
Kent - - -	484,297	418	319	9	32	8	1	23	1	161	80	7	29	3	—	14	—	23	76
Sussex - - -	338,935	321	253	5	13	3	3	21	1	162	47	4	12	1	1	9	—	17	44
Southampton - -	405,432	335	240	4	22	4	7	12	2	143	36	2	19	1	—	2	—	12	36
Berks - - -	199,106	283	167	5	4	1	—	9	—	108	18	4	1	1	—	—	—	6	12
Middlesex - -	150,606	57	42	5	—	—	5	12	1	19	12	2	—	—	4	6	—	1	13
Herts - - -	178,953	163	129	2	6	—	2	12	5	88	23	1	6	—	2	5	2	7	23
Buckingham - -	143,492	192	152	5	2	—	—	25	2	86	51	5	—	—	—	18	—	20	43
Oxford - - -	169,828	289	217	3	1	6	—	12	5	158	55	3	1	3	—	7	2	28	44
Northampton -	210,489	315	252	6	5	3	—	19	1	184	65	5	5	3	—	6	1	33	53
Huntingdon - -	60,319	87	67	—	5	2	—	3	—	48	28	—	5	2	—	1	—	14	22
Bedford - -	129,668	135	104	7	4	1	1	4	2	69	36	5	4	1	1	1	—	21	33
Cambridge - -	191,800	173	132	13	2	15	1	12	—	75	36	5	—	14	—	2	—	13	34
Essex - - -	344,077	370	320	11	20	—	1	23	—	186	79	8	20	—	—	11	—	37	76
Suffolk - - -	335,780	514	365	18	21	2	—	43	—	224	67	5	18	2	—	8	1	24	58
Norfolk - -	433,553	736	530	15	34	1	3	40	2	380	92	10	34	1	—	12	—	33	90
Wilts - - -	240,468	306	222	5	3	3	3	18	—	146	53	2	3	2	—	14	—	31	52
Dorset - - -	177,057	282	186	8	5	—	1	6	1	116	16	2	4	—	—	2	—	8	16
Devon - - -	565,698	468	357	10	19	4	4	50	4	209	75	5	16	3	1	21	1	19	66
Cornwall - -	355,392	221	177	13	6	2	—	29	—	96	29	4	1	1	—	12	—	10	28
Somerset - -	461,884	490	389	16	6	1	1	31	—	261	45	6	5	—	—	13	—	20	44
Gloucester - -	419,492	359	290	2	30	2	1	5	—	166	45	1	25	2	—	1	—	15	44
Hereford - -	98,917	212	156	1	8	—	1	5	—	102	25	1	8	—	—	3	—	13	25
Worcester - -	257,144	227	172	3	17	2	2	17	—	101	25	3	12	1	1	6	—	2	25
Shropshire - -	237,965	270	212	—	9	1	3	—	1	115	21	—	8	1	—	—	—	12	21
Stafford - -	598,716	210	182	8	8	7	5	7	2	115	30	5	6	5	2	4	—	8	30
Warwick - -	470,079	263	203	9	5	—	2	7	—	146	32	6	3	—	2	3	—	18	32
Leicester - -	234,166	323	242	6	8	—	—	18	—	178	46	5	8	—	—	8	—	28	44

Rutland - -	24,214	65	44	—	—	—	—	—	2	29	6	—	—	—	—	—	3	8
Lincoln - -	397,637	715	555	11	22	2	1	20	6	385	111	10	22	2	—	8	57	103
Nottingham - -	293,331	293	240	6	4	3	6	16	1	182	39	2	8	2	4	7	19	87
Derby - - -	291,808	825	266	4	6	1	2	19	2	200	26	2	6	1	—	2	15	26
Chester - - -	550,643	505	414	8	17	5	6	28	8	249	65	5	12	4	5	18	19	64
Lancaster - -	1,945,525	454	397	9	9	4	8	16	—	216	118	14	14	5	6	36	48	118
York, West Riding	1,270,278	646	544	22	19	6	19	51	—	346	114	21	15	6	8	24	40	114
York, East Riding	220,319	352	299	2	8	1	1	7	1	224	34	2	5	1	1	4	21	34
York, North Riding	223,116	502	417	4	30	1	—	35	2	298	96	2	30	1	—	12	51	96
Durham - -	411,538	307	257	9	17	1	1	16	—	166	59	7	14	1	—	6	29	57
Northumberland -	303,489	538	440	14	15	—	1	2	7	316	31	8	7	—	—	—	15	30
Cumberland - -	195,210	200	173	8	5	4	—	4	—	113	23	2	5	3	—	4	8	22
Westmorland -	58,387	109	92	2	2	—	—	7	—	58	10	1	2	—	—	1	5	9
Monmouth - -	177,130	161	119	3	—	1	1	1	1	82	15	1	—	1	1	1	11	15
Glamorgan - -	240,031	162	112	18	2	—	41	—	—	46	43	11	—	—	24	—	8	43
Carmarthen - -	94,672	61	46	1	1	—	10	—	—	19	3	—	—	—	3	—	—	3
Pembroke - -	84,191	143	100	1	7	—	33	—	—	46	20	1	7	—	11	—	1	20
Cardigan - -	97,614	128	73	—	1	1	35	2	—	60	1	—	—	—	1	—	—	1
Brecknock - -	59,178	106	71	3	3	—	23	1	—	36	8	1	3	—	8	1	—	8
Radnor - -	31,425	72	49	1	2	1	11	—	—	28	1	1	—	—	—	—	—	1
Montgomery -	73,256	69	48	1	1	—	1	2	—	22	8	1	—	—	—	2	5	8
Flint - - -	41,047	14	11	—	1	—	—	2	—	6	4	—	1	—	1	—	2	4
Denbigh - -	94,698	98	86	1	5	—	1	5	—	48	11	1	2	—	1	3	4	11
Merioneth - -	51,307	48	31	—	—	—	—	1	—	21	6	—	—	—	—	1	5	6
Carnarvon - -	63,864	63	50	—	—	1	—	2	—	36	2	—	—	1	—	—	1	2
Anglesea - -	73,954	74	52	1	2	—	5	5	—	41	11	—	1	—	1	3	6	11
	RETURN of single Parishes under the 43d Eliz. c. 2, and certain Extra-Parochial Places.																	
	Population in 1851.	Number of Parishes.																
Lancaster - -	2,072	9	5	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—
Montgomery -	3,820	7	5	—	1	—	—	—	—	4	1	—	1	—	—	—	—	1
Stafford - -	40	2	2	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—
Sussex - -	460	4	4	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—
Wilts - - -	328	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
York, North Riding	707	4	2	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Ditto, West Riding	74,242	57	40	—	2	—	—	1	—	31	2	—	2	—	—	—	—	2
TOTAL - - -	15,533,187	14,398	11,222	311	479	95	250	715	57	7,216	2,053	201	406	75	86	328	12	846	1,954

NUISANCES REMOVAL ACT.

RETURN stating which of the LOCAL AUTHORITIES is acting for each PARISH in *England* under the Provisions of the NUISANCES REMOVAL ACT, and specifying the Parishes for which a SANITARY INSPECTOR has been appointed.

(*Mr. Cowper.*)

Ordered, by The House of Commons, *to be Printed,*
15 *May* 1857.

36—Sess. 2.

Under 1 *oz.*

PAROCHIAL ELECTIONS.

RETURN to an Address of the Honourable The House of Commons, dated 5 February 1857;—*for*,

" RETURN setting forth, in Columns, the Names of the PARISHES in Schedule (A.) of the Act 18 & 19 Vict. c. 120; the Names or Numbers of the WARDS into which each Parish has been divided under the Provisions of the said Act; the Number of PAROCHIAL REPRESENTATIVES for each Ward; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION of November 1855 in each Ward; the Number of Persons who Voted at that Election (if there was not any Contest, the Column to be filled up 'No Contest'); and the Number not Voting:"

" And, similar RETURN for PARISHES in Schedule (B.); in case any Parish has not been divided, the Returns are to set forth the Name of the Parish; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION of November 1855; the Number of Persons who Voted at that Election (if there was not any Contest, the Column to be filled up 'No Contest'); and the Number not Voting."

(*Sir John Shelley.*)

Ordered, by The House of Commons, *to be Printed,*
8 *May* 1857.

3—(Sess. 2).

RETURNS of the Names of the PARISHES in Schedules (A.) and (B.) of the Act 18 & 19 Vict. c. 120; the Names or Numbers of the WARDS into which each Parish has been divided under the Provisions of the said Act; the Number of PAROCHIAL REPRESENTATIVES for each Ward; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION of November 1855 in each Ward; the Number of Persons who Voted at that Election; and the Number not Voting.

SCHEDULE (A.)

PART I.—PARISHES each Electing TWO MEMBERS of the METROPOLITAN BOARD of WORKS.

NAMES of PARISHES.	NAMES AND NUMBERS OF WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, Nov. 1855.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
St. Marylebone	No. 1, or Hamilton Terrace Ward	9	855	No contest.	
	No. 2, or St. John's Wood Terrace Ward	9	1,357	554	803
	No. 3, or New Church Street Ward	15	2,047	516	1,531
	No. 4, or Dorset Square and Regent's Park Ward.	15	1,749	No contest.	
	No. 5, or Bryanston Square Ward	18	1,821	527	1,294
	No. 6, or Portman Ward	18	1,888	420	1,468
	No. 7, or Portland Place Ward	18	1,842	466	1,376
	No. 8, or Cavendish Square Ward	18	1,851	No contest.	
St. Pancras, Middlesex	No. 1	9	1,100	401	699
	No. 2	12	1,250	685	565
	No. 3	18	2,190	1,101	1,089
	No. 4	15	1,562	761	801
	No. 5	15	1,950	No contest.	
	No. 6	15	2,435	598	1,837
	No. 7	18	1,860	779	1,081
	No. 8	18	2,503	No contest.	
St. Mary, Lambeth	No. 1, or North Marsh Ward	18	1,405	No contest.	
	No. 2, or South Marsh Ward	12	1,006	- ditto.	
	No. 3, or Bishop's Ward	12	951	- ditto.	
	No. 4, or Prince's Ward	15	1,330	- ditto.	
	No. 5, or Vauxhall Ward	24	1,568	- ditto.	
	No. 6, or Stockwell Ward	15	1,281	- ditto.	
	No. 7, or Brixton Ward	15	1,625	- ditto.	
	No. 8, or Norwood Ward	9	723	- ditto.	
St. George, Hanover Square.	Dover	- -	845	No contest.	
	Conduit	- -	597	- ditto.	
	Grosvenor	- -	756	- ditto.	
	Brook	- -	947	- ditto.	
	Curzon	- -	595	- ditto.	
	Knightsbridge	- -	2,158	- ditto.	
	Out	- -	2,948	- ditto.	
St. Mary, Islington	No. 1, Upper Holloway	9	1,183	No contest.	
	No 2, Lower Holloway	12	1,509	224	1,285
	No. 3, Highbury	15	1,560	No contest.	
	No. 4, Thornhill	18	2,487	- ditto.	
	No. 5, Barnsbury	18	2,200	- ditto.	
	No. 6, St. Mary's	15	1,692	- ditto.	
	No. 7, Canonbury	15	1,817	- ditto.	
	No. 8, St. Peter's	18	2,318	- ditto.	
St. Leonard, Shoreditch	No. 1, Moorfields Ward	18	1,316	No contest.	
	No. 2, Church Ward	21	1,674	540	1,134
	No. 3, Hoxton Ward	21	1,540	No contest.	
	No. 4, Wenlock Ward	18	1,390	- ditto.	
	No. 5, Whitmore Ward	12	1,063	- ditto.	
	No. 6, Kingsland Ward	12	979	- ditto.	
	No. 7, Haggerstone Ward	9	733	- ditto.	
	No. 8, Acton Ward	9	802	251	248

SCHEDULE (A.)—*continued.*

PART II.—PARISHES each Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

NAMES of PARISHES.	NAMES AND NUMBERS OF WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, Nov. 1855.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
Paddington	No. 1	12	952	125	827
	No. 2	18	1,504	232	1,272
	No. 3	18	1,107	No contest.	
	No. 4	24	1,535	- ditto.	
St. Matthew, Bethnal Green.	No. 1, East Ward	9	872	No contest.	
	No. 2, North Ward	9	847	195	652
	No. 3, West Ward	15	809	281	528
	No. 4, South Ward	15	1,006	No contest.	
St. Mary, Newington	- - - - No Return.				
St. Giles, Camberwell	No. 1, St. George's East Ward	12	1,117	No contest.	
	No. 2, St. George's West Ward	12	1,229	- ditto.	
	No. 3, Camden	12	1,060	467	593
	No. 4, North Peckham	15	964	No contest.	
	No. 5, South Peckham	15	902	- ditto.	
	No. 6, Camberwell and Dulwich	18	1,033	- ditto.	
St. James, Westminster	Pall mall	12	753	No contest -	753
	Church	15	901	- ditto -	901
	Golden-square	9	763	- ditto -	763
	Great Marlborough	12	1,010	- ditto -	1,010
St. James and St. John, Clerkenwell.	No. 1	12	895	No contest.	
	No. 2	15	1,013	- ditto.	
	No. 3	12	818	- ditto.	
	No. 4	18	1,330	- ditto.	
	No. 5	15	864	- ditto.	
St. Luke, Chelsea	No. 1, Stanley	9	802	No contest.	
	No. 2, Church	18	1,743	- ditto.	
	No. 3, Hans Town	21	1,402	- ditto.	
	No. 4, Royal Hospital	12	1,071	- ditto.	
St. Mary Abbotts, Kensington.	St. John and St. James, Norlands, Notting Hill.	27	2,403	No contest.	
	St. Mary Abbotts	30	2,288	- ditto.	
	Holy Trinity, Brompton	27	2,065	- ditto.	
St. Luke, Middlesex	- - - - No Return.				
St. George-the-Martyr, Southwark.	No. 1, St. Michael's Ward	18	1,122	440	682
	No. 2, St. Paul's Ward	15	818	308	510
	No. 3, St. George's Ward	15	805	246	559
St. Mary Magdalen, Bermondsey.	No. 1	9	835	No contest.	
	No. 2	9	823	- ditto.	
	No. 3	9	674	- ditto.	
	No. 4	9	693	- ditto.	
St. George-in-the-East	North Ward	18	1,588	877	1,211
	South Ward	18	974	340	634
St. Martin-in-the-Fields	No. 1	12	623	164	459
	No. 2	12	900 *	406	494
	No. 3	12	692	246	446
Hamlet of Mile End Old Town.	North Ward	15	6,851	No contest.	
	East Ward	12			
	Centre Ward	21			
	West Ward	18			
	South Ward	18			
Woolwich.†					
St. Mary, Rotherhithe	- - - - - - - - - - -	- -	1,923	No contest.	
St. John, Hampstead	- - - - - - - - - - -	24	Under 2,000	No contest.	

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* These numbers are the total persons rated when the award for dividing the parish was made, and therefore some deduction should be made for those disqualified (I think, about 5 per cent.) at the election.

† The 18 & 19 Vict. c. 120, is not applicable to this parish, inasmuch as the provision contained in the 238th section specially exempts this district from its operation.

SCHEDULE (B.)

PARISHES UNITED INTO DISTRICTS FOR THE PURPOSES OF THE ACT.

PART I.—DISTRICTS each Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

NAMES of DISTRICTS.	PARISHES AND WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, Nov. 1855.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
Whitechapel District - -	St. Mary, Whitechapel:				
	No. 1, or East Ward - -	15	821	44	777
	No. 2, or Middle Ward -	9	362	18	344
	No. 3, or South Ward - -	12	454	63	391
	Christchurch, Spitalfields - -	- -	726	241	485
	St. Botolph-without-Aldgate -	- - No Return.			
	Holy Trinity, Minories - -	- - No Return.			
	St. Katherine, Precinct of - -	- - No Return.			
	Mile End New Town, Hamlet of -	- -	71	No contest.	
	Norton Folgate, Liberty of - -	- -	200	No contest.	
	Old Artillery Ground - - -	- -	36	No contest.	
	Tower, District of - - -	- -	29	No contest.	
Westminster District - -	St. Margaret - - - - -	- - No Return.			
	St. John the Evangelist:				
	Ward No. 1 - - - - -	9	1,020	No contest.	
	Ward No. 2 - - - - -	15	1,032	- ditto.	
	Ward No. 3 - - - - -	12	989	- ditto.	
Greenwich District - -	St. Paul, Deptford:				
	No. 1, or North Ward - -	15	1,104	No contest.	
	No. 2, or South Ward - -	21	1,427	- ditto.	
	No. 3, or East Ward - -	18	1,610	- ditto.	
	No. 4, or West Ward - -	18	917	- ditto.	
	St. Nicholas, Deptford - -	- -	739	28	711
	Greenwich:				
	No. 1, or Church Ward -	15	787	102	685
	No. 2, or Ravensbourne Ward	12	822	No contest.	
	No. 3, or Hospital Ward -	12	639	- ditto.	
	No. 4, or Blackheath Ward -	9	453	- ditto.	
Wandsworth District - -	Clapham:				
	No. 1, North Ward - -	21	1,091	No contest	
	No. 2, South Ward - -	15	454	- ditto.	
	Tooting Graveney - - - -	- -	180	No contest.	
	Streatham - - - - - -	- -	755	No contest.	
	St. Mary, Battersea - - - -	- -	1,700	No contest.	
	Wandsworth - - - - -	- -	657	139	518
	Putney, including Roehampton (not divided).	- -	992	No contest.	
Hackney District - -	Hackney:				
	No. 1, Stamford Hill Ward -	15	No record	No contest.	
	No. 2, West Ward - -	18			
	No. 3, De Beauvoir Town Ward	18			
	No. 4, Dalston Ward - -	18			
	No. 5, Hackney Ward - -	18			
	No. 6, Homerton Ward -	15			
	No. 7, South Ward - -	18			
	St. Mary, Stoke Newington - -	- -	597	No contest.	

SCHEDULE (B.)—Part I.—Districts each Electing One Member of the Metropolitan Board of Works—*continued.*

NAMES of DISTRICTS.	PARISHES AND WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, Nov. 1855.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
St. Giles District - -	St. Giles-in-the-Fields - - - -	- -	1,327	788	539
	St. George, Bloomsbury - -	-	1,303	692	611
Holborn District - - -	St. Andrew, Holborn, above Bars -	- -	1,879	No contest.	
	St. George-the-Martyr - - - -	- -	711	No contest.	
	St. Sepulchre - - - - -	- -	389	20 ratepayers present. No contest -	369
	Liberty of Saffron Hill, Hatton Garden, and Ely Rents.	- -	496	No contest.	
	Liberty of Glasshouse Yard - -	- -	27	6 No contest	21
Strand District - - -	St. Anne, Soho - - - - -	- - No Return.			
	St. Paul, Covent Garden - -	18	427	No contest.	
	St. John the Baptist, Savoy, or Precinct of the Savoy.	- - No Return.			
	St. Mary-le-Strand - - - -	- - No Return.			
	St. Clement Danes - - - -	- -	727	477	250
	Liberty of the Rolls - - - -	- -	324	No contest.	
Fulham District - - -	Hammersmith - - - - -	- -	1,570	684	886
	Fulham - - - - - - -	- -	910	122	788
Limehouse District - -	St. Anne, Limehouse - - - -	- - No Return.			
	St. John, Wapping - - - -	- - No Return.			
	St. Paul, Shadwell - - - -	- - No Return.			
	Ratcliffe, Hamlet of - - - -	- - No Return.			
Poplar District - - -	All Saints, Poplar - - -	24	1,532	538	994
	St. Mary, Stratford-le-Bow - -	- -	803	30	773
	St. Leonard, Bromley - - - -	- -	910	No contest.	
St. Saviour's District - -	Christchurch - - - - -	- - No Return.			
	St. Saviour's, Southwark - -	- -	1,029	44	985

PART II.—DISTRICTS for Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

Plumstead District - -	Charlton - - - - - - -	- -	735	No contest.	
	Plumstead - - - - - -	- - No Return.			
	Eltham - - - - - - -	- -	420	No contest.	
united with	Lee - - - - - - - -	- -	730	No contest.	
	Kidbrooke - - - - - -	- -	99	No contest.	
Lewisham District - -	Lewisham, including Sydenham Chapelry.	- - No Return.			
	Hamlet of Penge - - - -	- -	191	No contest.	

PART III.

SCHEDULE (B.)—*continued.*

PART III.— PARISH and DISTRICT United for Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

NAMES of DISTRICTS.	PARISHES AND WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, Nov. 1855.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
The Parish of Rotherhithe, united with St. Olave District - -	St. Olave - - - - - - -	- - No Return.			
	St. Thomas, Southwark - -	18 and 3 ex officio.	109	No contest.	
	St. John, Southwark - - -	23 *	910	No contest.	

* 18 elected for whole parish, who, with the rector and churchwardens (5), make 23.

PAROCHIAL ELECTIONS.

RETURN of the Names of the PARISHES in Schedules (A.) and (B.) of the Act 18 & 19 Vict. c. 120; the Names or Numbers of the WARDS into which each Parish has been divided; the Number of PAROCHIAL REPRESENTATIVES for each Ward; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION of November 1855; the Number who Voted at that Election; and the Number not Voting.

(Sir John Shelley.)

Ordered, by The House of Commons, *to be Printed,*
8 *May* 1857.

3—(Sess. 2).

Under 1 *oz.*

PAROCHIAL ELECTIONS.

ABSTRACT

OF

RETURN to an Address of the Honourable The House of Commons,
dated 18 June 1857;—*for*,

A "RETURN setting forth, in Columns, the Names of the PARISHES in Schedule (A.) of the Act 18 & 19 Vict. c. 120; the Names or Numbers of the WARDS into which each Parish has been divided under the Provisions of the said Act; the Number of PAROCHIAL REPRESENTATIVES for each Ward; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION, 1857, in each Ward; the Number of Persons who Voted at that Election (if there was not any Contest, the Column to be filled up 'No Contest'); and the Number not Voting:"

"And, similar RETURN for PARISHES in Schedule (B.); in case any Parish has not been divided, the Returns are to set forth the Name of the Parish; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION, 1857; the Number of Persons who Voted at that Election (if there was not any Contest, the Column to be filled up 'No Contest'); and the Number not Voting (in continuation of Parliamentary Paper, No. 3, of the present Session)."

(*Viscount Ebrington.*)

Ordered, by The House of Commons, *to be Printed*,
28 *August* 1857.

333—Sess. 2.

RETURNS of the Names of the PARISHES in Schedules (A.) and (B.) of the Act 18 & 19 Vict. c. 120; the Names or Numbers of the WARDS into which each Parish has been divided under the Provisions of the said Act; the Number of PAROCHIAL REPRESENTATIVES for each Ward; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION, 1857, in each Ward; the Number of Persons who Voted at that Election; and the Number not Voting.

SCHEDULE (A.)

PART I.—PARISHES each Electing Two MEMBERS of the METROPOLITAN BOARD of WORKS.

NAMES of PARISHES.	NAMES AND NUMBERS OF WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, 1857.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
St. Marylebone	No. 1, or Hamilton Terrace Ward	9	729	74	655
	No. 2, or St. John's Wood Terrace Ward	9	1,117	No contest.	
	No. 3, or New Church Street Ward	15	2,026	- ditto.	
	No. 4, or Dorset Square and Regent's Park Ward.	15	1,735	178	1,560
	No. 5, or Bryanstone Square Ward	18	1,644	598	1,046
	No. 6, or Portman Ward	18	1,781	No contest.	
	No. 7, or Portland Place Ward	18	1,425	- ditto.	
	No. 8, or Cavendish Square Ward	18	1,827	- ditto.	
St. Pancras, Middlesex	No. 1	9	1,164	No contest.	
	No. 2	12	1,234	462	772
	No. 3	18	2,126	1,014	1,112
	No. 4	15	1,500	494	1,006
	No. 5	15	1,741	982	759
	No. 6	15	2,091	No contest.	
	No. 7	18	1,672	- ditto.	
	No. 8	18	2,081	739	1,342
St. Mary, Lambeth	- - - - No Return.				
St. George, Hanover Square.	Dover	6	385	No contest.	
	Conduit	9	619	- ditto.	
	Grosvenor	12	842	264	
	Brook	15	1,078	No contest.	
	Curzon	12	713	- ditto.	
	Knightsbridge	27	2,446	- ditto.	
	The Out	27	3,729	- ditto.	
St. Mary, Islington	No. 1, Upper Holloway	9	1,759	No contest.	
	No. 2, Lower Holloway	12	1,911	- ditto.	
	No. 3, Highbury	15	1,987	- ditto.	
	No. 4, Thornhill	18	2,854	- ditto.	
	No. 5, Barnsbury	18	2,290	- ditto.	
	No. 6, St. Mary's	15	1,815	- ditto.	
	No. 7, Canonbury	15	2,196	218	1,978
	No. 8, St. Peter's	18	2,630	225	2,405
St. Leonard, Shoreditch	- - - - No Return.				

SCHEDULE (A.)—*continued.*

PART II.—PARISHES each Electing ONE MEMBER of the METROPOLITAN BOARD OF WORKS.

NAMES of PARISHES.	NAMES AND NUMBERS OF WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Elections, 1857.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
Paddington	No. 1	-	-	322	
	No. 2	-	-	100	
	No. 3	-	-	No contest.	
	No. 4	-	-	ditto.	
St. Matthew, Bethnal Green.	East Ward	9	987	No contest.	
	West Ward	15	1,029	161	
	North Ward	9	984	No contest.	
	South Ward	15	1,046	ditto.	
St. Mary, Newington	No. 1, or St. Mary's Ward	18	1,343	No contest.	
	No. 2, or Trinity Ward	18	1,770	ditto.	
	No. 3, or St. Paul's Ward	15	1,380	ditto.	
	No. 4, or St. Peter's Ward	21	1,816	415	1,401
St. Giles, Camberwell	No. 1, St. George's West Ward	12	780	45 *	735
	No. 2, St. George's East Ward	12	900	No contest	900
	No. 3, Camden Ward	12	1,074	ditto	1,074
	No. 4, North Peckham Ward	15	1,124	ditto	1,124
	No. 5, South Peckham Ward	15	952	ditto	952
	No. 6, Camberwell and Dulwich Ward	18	1,056	ditto	1,056
St. James, Westminster	Pall-mall	12	754	No contest	754
	Golden Square	9	765	ditto	765
	Great Marlborough	12	1,021	ditto	1,021
	Church	15	911	243	668
St. James and St. John, Clerkenwell.	No. 1	12	917	No contest.	
	No. 2	15	553	ditto.	
	No. 3	12	1,115	ditto.	
	No. 4	18	1,306	ditto.	
	No. 5	15	984	189	795
St. Luke, Chelsea	No. 1, Stanley	9	684	No contest.	
	No. 2, Church	18	1,450	ditto	
	No. 3, Hans Town	21	1,360	251	
	No. 4, Royal Hospital	12	920	140	
St. Mary Abbot, Kensington.	St. Mary Abbot, Kensington	30	2,268	No contest.	
	St. John, Nottinghill, and St. James, Norland.	27	2,325	ditto.	
	The Holy Trinity, Brompton	27	1,866	ditto.	
St. Luke, Middlesex	No. 1	12	727	No contest.	
	No. 2	6	558	ditto.	
	No. 3	9	775	ditto.	
	No. 4	12	815	ditto.	
	No. 5	9	594	ditto.	
St. George-the-Martyr, Southwark.	No. 1, St. Michael's Ward	18	1,084	238	846
	No. 2, St. Paul's Ward	15	757	253	504
	No. 3, St. George's Ward	15	795	236	559
Bermondsey, Surrey	No. 1	9	690	139	551
	No. 2	9	662	No contest.	
	No. 3	9	658	ditto.	
	No. 4	9	650	176	474
St. George-in-the-East	No. 1, North Ward	18	1,588	353	1,235
	No. 2, South Ward	18	974	325	649
St. Martin-in-the-Fields	No. 1	12	520	134	386
	No. 2	12	652	212	440
	No. 3	12	587	No contest.	
Hamlet of Mile End Old Town.	No. 1, North	15	1,001	No contest.	
	No. 2, East	12	460	ditto.	
	No. 3, West	18	1,009	ditto.	
	No. 4, Centre	21	1,325	ditto.	
	No. 5, South	18	1,130	ditto.	
Woolwich. †					
Rotherhithe, Surrey	-	-	1,943	No contest.	
St. John, Hampstead	-	-	1,404	144	1,260

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* A poll was demanded; but it was not considered an election by the parish, the party demanding the poll having abandoned it.

† The 18 & 19 Vict. c. 120, is not applicable to this parish, inasmuch as the 238th section specially exempts this district from its operations.

SCHEDULE (B.)

PARISHES UNITED INTO DISTRICTS FOR THE PURPOSES OF THE ACT.

PART I.—DISTRICTS each Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

NAMES of DISTRICTS.	PARISHES AND WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, 1857.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
Whitechapel District -	St. Mary, Whitechapel - - - -	- - No Return.			
	Christchurch, Spitalfields - - - -	- -	662	No contest.	
	St. Botolph-without-Aldgate, including the Mint and St. Katherine Docks.	- -	251	No contest.	
	Holy Trinity, Minories - - - -	- -	72	No contest.	
	St. Katherine, Precinct of - - - -	- -	- -	No contest.	
	Mile End New Town, Hamlet of - -	- -	251	No contest.	
	Norton Folgate, Liberty of - - - -	- -	201	No contest.	
	Old Artillery Ground - - - - -	- -	132	No contest.	
	Tower, District of - - - - -	- - No Return.			
Westminster District -	St. Margaret:				
	No. 1 - - - - - - -	12	399	No contest.	
	No. 2 - - - - - - -	9	445	- ditto.	
	No. 3 - - - - - - -	15	648	- ditto.	
	St. John the Evangelist - - - -	- - No Return.			
Greenwich District -	St. Paul, Deptford, including Hatcham:				
	No. 1, or North Ward - - - -	15	1,132	No contest.	1,132
	No. 2, or South Ward - - - -	21	1,573	- ditto -	1,573
	No. 3, or East Ward - - - -	18	1,910	- ditto -	1,910
	No. 4, or West Ward - - - -	18	1,005	- ditto -	1,005
	St. Nicholas, Deptford - - - -	- -	787	16	771
	Greenwich:				
	No. 1, Church Ward - - - -	15	803	232	571
	No. 2, Ravensbourne Ward - -	12	874	No contest.	
	No. 3, Hospital Ward - - - -	12	740	210	530
	No. 4, Blackheath Ward - -	9	544	No contest.	
Wandsworth District -	Clapham:				
	No. 1, North Ward - - - -	21	1,142	No contest.	
	No. 2, South Ward - - - -	15	606	- ditto.	
	Tooting Graveney - - - - -	- -	185	7	178
	Streatham - - - - - - - -	- -	790	No contest.	
	St. Mary, Battersea - - - - -	- -	1,500	No contest.	
	Wandsworth - - - - - - -	- - No Return.			
	Putney - - - - - - - -	- -	497	No contest.	
Hackney District - -	No. 1, Hackney - - - - - -	18	1,399	No contest.	
	No. 2, Homerton - - - - - -	15	776		
	No. 3, South - - - - - -	18	1,035		
	No. 4, Stamford Hill - - - - -	15	641		
	No. 5, Dalston - - - - - -	18	3,255		
	No. 6, West - - - - - -	18	1,015		
	No. 7, De Beauvoir Town - - -	18	1,574		
	St. Mary, Stoke Newington - -	- -	609	No contest.	

SCHEDULE (B.)—Part I.—Districts each Electing One Member of the Metropolitan Board of Works—*continued.*

NAMES of DISTRICTS.	PARISHES AND WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, 1857.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
St. Giles District - -	St. Giles-in-the-Fields - - - - -	- -	1,091	No contest.	
	St. George, Bloomsbury - - - -	- -	1,159	No contest.	
Holborn District - -	St. Andrew, Holborn, above Bars -	- -	1,879	341	1,538
	St. George-the-Martyr - - - -	- -	711	249	462
	St. Sepulchre - - - - - -	- -	384	No contest*	361
	Liberty of Saffron Hill, Hatton Garden, and Ely Rents.	- -	463	No contest.	
	Liberty of Glasshouse Yard - - - -	- -	58	No contest -	55
Strand District - -	St. Anne, Westminster - - - - -	- -	1,270	330	940
	St. Paul, Covent Garden - - -	- -	430	No contest.	
	St. Mary-le-Strand - - - - -	- -	175	No contest.	
	Precinct of the Savoy - - - - -	- -	75	No contest.	
	St. Clement Danes - - - - -	- -	1,820	No contest.	
	Liberty of the Rolls - - - - -	- -	328	No contest.	
Fulham District - -	Hammersmith - - - - - -	- -	1,554	No contest.	
	Fulham - - - - - - - -	- - No Return.			
Limehouse District -	St. Anne, Limehouse - - - - -	- -	1,600	199	1,401
	St. John, Wapping - - - - -	- -	250	16 No contest	234
	St. Paul, Shadwell - - - - -	- - No Return.			
	Ratcliffe, Hamlet of - - - - -	- - No Return.			
Poplar District - -	All Saints, Poplar - - - - -	24	1,505	No contest.	
	St. Mary, Stratford, Bow - - -	- -	273	No contest.	
	Bromley, St. Leonard - - - - -	- -	1,014	No contest.	
St. Saviour's District -	Christchurch - - - - - -	- - No Return.			
	St. Saviour's, Southwark - - - -	- -	1,091	33 No contest -	1,058

PART II.—DISTRICTS for Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

Plumstead District -	Charlton - - - - - - - -	- -	792	100	
	Plumstead - - - - - - - -	- - No Return.			
united with	Kidbrooke - - - - - - - -	- -	102	No contest.	
	Eltham - - - - - - - -	- -	527	No contest.	
	Lee - - - - - - - - -	- -	776	No contest.	
Lewisham District -	Lewisham - - - - - - - -	- - No Return.			
	Hamlet of Penge - - - - -	18	367	No contest.	

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* The number present at the Parochial Election, 1857, was 23 parishioners, all inhabitant ratepayers.

SCHEDULE (B.)—*continued.*

PART III.—PARISH and DISTRICT United for Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

NAMES of DISTRICTS.	PARISHES AND WARDS.	Number of Parochial Representatives for each Ward.	Number of Ratepayers entitled to Vote at Parochial Election, 1857.	Number of Ratepayers who Voted at that Election.	Number of Ratepayers not Voting.
The Parish of Rotherhithe, united with St. Olave District	St. Olave, Southwark	-	480	No contest.	
	St. Thomas, Southwark	21	120	No contest.	
	St. John, Southwark	23	912	No contest.	

PAROCHIAL ELECTIONS.

ABSTRACT

OF

RETURN of the Names of the PARISHES in Schedules (A.) and (B.) of the Act 18 & 19 Vict. c. 120; the Names or Numbers of the WARDS into which each Parish has been divided; the Number of PAROCHIAL REPRESENTATIVES for each Ward; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION, 1857; the Number who Voted at that Election; and the Number not Voting.

(*Viscount Ebrington.*)

Ordered, by The House of Commons, *to be Printed,*
28 *August* 1857.

333—Sess. 2. *Under* 1 *oz.*

ST. JAMES'S PARK.

RETURN to Two Orders of the Honourable The House of Commons, dated 20 May and 5 June 1857;—*for*,

86. Sess. 2.—ST. JAMES'S PARK.

It is requested that this Paper may be substituted for the corresponding one, delivered on the 15th inst.

19 *June* 1857.

(ORDER, 5 June 1857.)

"THAT there be added to the RETURN ordered on the 20th day of May last, relative to ST. JAMES'S PARK, a Copy of any REPORT made to the First Commissioner of Works upon the State of the WATER from which the LAKE in ST. JAMES'S PARK was supplied."

(*Sir Benjamin Hall.*)

Ordered, by The House of Commons, *to be Printed*,
9 *June* 1857.

SCHEDULE (B.)—*continued.*

PART III.—PARISH and DISTRICT United for Electing ONE MEMBER of the METROPOLITAN BOARD of WORKS.

NAMES		Number of Parochial	Number of Ratepayers entitled to	Number of Ratepayers Voted	Number

PAROCHIAL ELECTIONS.

ABSTRACT

OF

RETURN of the Names of the PARISHES in Schedules (A.) and (B.) of the Act 18 & 19 Vict. c. 120; the Names or Numbers of the WARDS into which each Parish has been divided; the Number of PAROCHIAL REPRESENTATIVES for each Ward; the Number of RATEPAYERS entitled to Vote at the PAROCHIAL ELECTION, 1857; the Number who Voted at that Election; and the Number not Voting.

(*Viscount Ebrington.*)

Ordered, by The House of Commons, *to be Printed,*
28 *August* 1857.

333—Sess. 2.

Under 1 *oz.*

ST. JAMES'S PARK.

RETURN to Two Orders of the Honourable The House of Commons, dated 20 May and 5 June 1857;—*for*,

(ORDER, 20 May 1857.)

A RETURN "of any SUMS expended for the Alterations in the LAKE in ST. JAMES'S PARK, together with an Estimate of Expenditure required to complete them, and the Vote of Parliament under Authority of which any Expenditure has been incurred:"

"And, COPY of any CORRESPONDENCE between the Board of Works and the Treasury respecting such Expenditure, and of any Order or Authority under which Payments have been made by the Paymaster-General for such Work, and the Dates of such Payments."

(*Sir Francis Baring.*)

(ORDER, 5 June 1857.)

"THAT there be added to the RETURN ordered on the 20th day of May last, relative to ST. JAMES'S PARK, a Copy of any REPORT made to the First Commissioner of Works upon the State of the WATER from which the LAKE in ST. JAMES'S PARK was supplied."

(*Sir Benjamin Hall.*)

Ordered, by The House of Commons, *to be Printed*,
9 *June* 1857.

ST. JAMES'S PARK.

1. Sums expended for the Alterations in the Lake in St. James's Park:—

	£.	s.	d.
For labour in digging, wheeling, levelling, and spreading concrete - - - - - - - - - -	3,636	14	2
For horse-hire, drain pipes, lime, ballast, furze bushes, materials, implements, and hire of steam-engine - -	1,877	1	10
£.	5,513	16	-

2. Estimate of expenditure required to complete the alterations, 6,171 *l.* 4 *s.*

3. The vote of Parliament under the authority of which any expenditure has been incurred.

The authority under which the expenditure for the alterations in the lake has been incurred, is a letter from the Lords Commissioners of Her Majesty's Treasury to the First Commissioner of Her Majesty's Works, &c., of the 27th August 1856.

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4. Copy of any Correspondence between the Board of Works and the Treasury respecting such Expenditure.

Gentlemen, Office of Works, &c., 30 July 1855.

I am directed by Sir Benjamin Hall to state, that during the time he held the office of President of the General Board of Health his attention was directed to the very offensive state of the Serpentine in Hyde Park, and the lake in St. James's Park. He is most anxious that these waters should be cleaned out, and a recurrence of the existing nuisance prevented for the future. It is obvious, however, that before this object can be completely accomplished, the sewage which now runs into the Serpentine should be turned off into a main sewer. It appears that the Ranelagh sewer has its source in the north-western part of the metropolis. There is one branch running from Frognell, near Hampstead, and another from Kensal New Town. These branches unite in one stream a little north of the Harrow Road, and pass through a sewer of 10 feet 6 inches by 8 feet 6 inches from Gloucester Terrace to the head of the Serpentine, near the Bayswater Road. At this point the sewer decreases in size from 8 feet 6 inches by 10 feet 6 inches to an opening of 6 feet by 4 feet, and when the sewage in this diminished aperture rises four feet above the bottom of the drain, the overflow is discharged into the Serpentine, thus causing the pollution of the water. Between Frognell and Kensal New Town at the north, and the Bayswater Road on the south, many thousand houses empty their filth into the sewer, and the great cemetery of Kensal Green has also its discharge into it. Independent of this abomination, a new cemetery is about to be opened at Kilburn; the soil is of a retentive character, and it will possibly be necessary that a drain should be made to each grave, the outlet for which will be the sewer which runs down to the Bayswater Road. It will thus be seen that when there is more than four feet of sewage matter in the drain by the Bayswater Road, not only must the superabundant filth, discharging from many thousands of human dwellings, be turned into the Serpentine, but the water, impregnated with the decomposition of hundreds, and perhaps thousands of human corpses, must also find its way into the Ornamental waters of Kensington Gardens and Hyde Park, to be inhaled by the inhabitants of this metropolis who resort to those places for recreation. It is Sir Benjamin Hall's desire to cleanse these waters in the ensuing autumn, and he wishes you to inform him—

1st. In what manner you could carry off the whole of the drainage which comes down to the Bayswater Road, so that it may pass into some of the great sewers which have their discharge at a lower level.

2d. Whether there are any engineering difficulties in the accomplishment of such an object.

3d. What length of time would be required for the completion of the work.

Sir B. Hall will be glad of as early an answer as you can give him to this communication.

With regard to the Ornamental Water in St. James's Park, Sir B. Hall believes that, before the lake can be drained off, a new sewer must be made at a lower level than the existing drain, which now runs under the surface of the parade on the west front of the Horse Guards. He will be glad if you will desire your engineer to call at this office, in order that arrangements may be entered into for the purpose of carrying out the object which Sir Benjamin Hall has in view.

I am, &c.

(signed) *John Thornborrow,*
Assistant Secretary.

The Metropolitan Commissioners of Sewers.

My Lords, Office of Works, &c., 12 October 1855.

During the period I held the office of President of the General Board of Health, my attention was directed to the very offensive and unwholesome state of the water in the Serpentine River in Hyde Park and Kensington Gardens, and in the lakes in Buckingham Palace Gardens and the Ornamental Inclosure in St. James's Park, which, as your Lordships are aware, has been the subject of very general complaint from all quarters for many years past.

At that time I had no authority or control over these parks and gardens, and consequently could take no steps for the removal of those evils. Upon my appointment to the office of First Commissioner of this department, I felt it to be my duty to consider what course it would be most advantageous to adopt for the purpose of putting the waters to which I have referred into a clean and sanitary state, and of preventing in future the possibility of their becoming so foul, offensive, and prejudicial to the public health as they now are.

It appears that the Serpentine derived its origin from several small streams which took their rise in the Highgate and Hampstead hills, and which, uniting together into one stream in the Bayswater Valley, formerly continued their course along the low ground between Kensington Gardens and Hyde Park, and from thence through Knightsbridge to the Thames. In the reign of King George 2d, several ponds which existed in Hyde Park and Kensington Gardens were thrown together, so as to form one piece of water, which is now called the Serpentine.

The river continued to be supplied from the Bayswater stream alone until the district through which it ran became so populous and so occupied with buildings, that the stream, in consequence of those buildings draining into it, became a common sewer, contaminated the Serpentine, and rendered it a nuisance.

Matters remained in this state until the year 1834, when it became necessary to devise the means of preventing the sewage from further polluting the river.

In this year an Act was passed (4 & 5 Will. 4, c. 96), which empowered the Commissioners of Sewers to construct a weir or tumbling bay, of the height of two feet, across the Bayswater stream, at or near the spot where the stream crosses the road at Bayswater, and a tunnel drain or sewer from such tumbling bay along the Uxbridge Road to the then existing tunnel sewer nearly opposite Albion-street in that road, so that all the water drainage and soil passing down the brook, and not passing over the weir, might flow along the tunnel sewer. The Act further provided that, in consideration of the advantage which the Crown would derive from the diversion of the soil drainage from the Serpentine, one

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one moiety of the cost of the works (7,000 *l.*) should be defrayed out of the land-revenues of the Crown, and it placed the new sewer and tumbling bay under the jurisdiction of the Commissioners of Sewers.

In the years 1836 and 1837 a coffer-dam was constructed on the east side of the bridge over the Serpentine. The water in Kensington Gardens was pumped out, and the whole of the mud cleared away at a cost of about 3,000 *l.*; but no further measures were then taken for excluding the sewage water, which continued to enter the river after passing over the weir.

In consequence of the deficient supply of water occasioned by this partial exclusion of the sewage from the Serpentine, and with a view to improve its condition, an arrangement was, in the year 1840, entered into by the Commissioners of Woods and Works with the Chelsea Water Company for obtaining an increased supply of water. The agreement with the Company stipulates that the Company should, at their own cost, lay down good and proper mains and pipes to the basin in Kensington Gardens, and should supply in each year not less than 150,000 tons of good clear water, free from mud and other impurities. The price to be paid to the Company is fixed by the contract, as follows, viz.—

For the first 150,000 tons that may be supplied, 2 *l.* 12 *s.* 6 *d.* per 1,000 tons.

For the next 50,000 tons 2 *l.* per 1,000; and

For the next 50,000, and beyond that quantity, 1 *l.* 6 *s.* 3 *d.* per 1,000 tons.

It was arranged that the water to be supplied by the Company should be delivered into the basin in Kensington Gardens, from whence it should run through pipes to be provided by the Commissioners of Woods, &c., into the Serpentine, from thence into the lake in Buckingham Palace Gardens, and from thence into the lake in St. James's Park, the surplus finding its way from that lake into the sewers. By this course the water which entered clean into the basin became mixed with sewage water in the Serpentine, and conveyed the filth and impurities with which it had become impregnated, into the lakes in Buckingham Palace Gardens and St. James's Park.

The agreement took effect from the 5th April 1840, and the term of it was 21 years from that date, and the amount paid to the Company for the supply of water amounts to between 500 *l.* and 600 *l.* a year.

This state of things continued until the year 1848, when, in consequence of the very general complaints which arose in regard to the state of the waters in the parks and gardens, the Commissioners of Woods, &c., appear to have had under consideration the foul state of these waters, and they instructed Sir J. Rennie, whose attention, it is stated, had previously been directed to the state of the Serpentine during the progress of the bridge over it, of which he was the engineer, to investigate the condition of the river, with the object of remedying existing defects, by thoroughly cleansing it, devising the means of preventing the future accumulation of noxious deposits, and making available every local or other supply of water that could be obtained within reasonable limits for maintaining it in a perfect and wholesome state.

From the report, dated October 28, 1848, which Sir John Rennie made to the Commissioners of Woods, it appears that at that time there was in the upper or Kensington Gardens division of the Serpentine a deposit of from one to four feet of mud and offensive matter, and of from two to six feet of similar matter in the Hyde Park or lower division.

Sir John Rennie attributed the defective state of the Serpentine to the foul sewage which found its way into it from the Bayswater stream, and to the scanty supply of fresh water, which, being quite inadequate to keep up a proper healthy circulation and change, became stagnant and putrid; the accumulation of foul mud, decayed leaves, weeds, and other organic matter, road sweepings, &c., which combined together, served further to contaminate the water, and to increase the nuisance materially.

The remedial measures which he recommended, in order to restore the Serpentine to what it was always intended to be, a fine piece of water, in a place allotted to the recreation of vast numbers of all classes of the community, were,—

1. That the whole of the water which entered the Serpentine from the Bayswater stream should be effectually excluded and diverted into another channel totally distinct from it.

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2. That all the foul mud and decayed vegetable matter should be removed; that the bottom of the river should be made to incline gradually from the upper to the lower part, so as to give a proper fall for drainage, which could be effected by regulation of the surface, and filling up any intervening holes that might be found; that gravel should be strewed along the margin for the depth of two or three feet under water surface, in order to keep the water clear, and that a proper sized drain should be carried down the centre of the bottom, with a grating and sluice at the lower end, so that at any time thereafter, if necessary, the whole of the water could be drawn off to the bottom.

By adopting these measures, Sir John Rennie considered that if the Serpentine were re-filled with pure water, and replenished to a certain extent by the winter rains, it would keep in a wholesome state for a considerable period, and thus time would be afforded for considering the mode in which a more effectual and plentiful supply of water could be obtained, so as to produce a constant circulation, either from the Water Companies, or by making reservoirs at the sources of the Brent or the Verulam, and bringing water from thence in proper channels.

With regard to the cost of the proposed works, Sir John Rennie stated that it was difficult to make an accurate estimate until the water should have been drawn off, so that the exact state and extent of the mud could be ascertained.

He considered the quantity of mud which would have to be removed to be about 83,663 cubic yards, and if one-half of this quantity could be used in widening the drives and walks along the shores, and the river was to be replenished once with water from one of the Water Companies, he estimated the expense at 12,570 *l.*; but he stated that if it should be determined to reduce the depth to five feet, an additional sum would be required, the amount of which would depend upon the place from whence the materials would have to be taken.

The Commissioners also consulted Mr. Mann, the superintendent of St. James's, Hyde and the Green Parks, and Kensington Gardens, from whom they likewise received a report, in which he concurred generally in the remarks of Sir J. Rennie in regard to the cause of the bad state of the waters, and as to the necessity of disconnecting the Bayswater brook from the Serpentine. He proposed that the mud should not be removed from the bed of the river, but that the slopes of the banks should be regulated so that the water should not exceed five feet at 50 or 60 feet from the shore, gradually deepening towards the centre, and that the bottom should be altered in such manner that the water should flow from both sides towards the centre, and from the west towards the east end; that a brick drain, with a proper sluice for emptying the water into the sewer, should be constructed along the Serpentine; that a coating of concrete, of the depth of one foot, should be laid over the whole of the bottom and sides of the river, by which means he considered that the water would be prevented from coming into contact with the mud as effectually as if it had been taken away, and at the same time would leave the bottom in a regular, uniform and firm state. As a reason in support of this proposal, Mr. Mann suggested, that if it were carried out, the water might be let off every year if necessary, and the bottom swept, which operation would, he thought, add little to the expense of the water supply, as in most cases the winter rains would be sufficient to fill the Serpentine by the latter end of February.

A further advantage Mr. Mann considered would be gained by adopting his plan for improving the Serpentine, inasmuch as if the bottom were regulated and covered with concrete, it would remain in a good state for centuries, and provide additional safety for bathers, while, if the mud were to be removed, as great an expense would have to be incurred, and the river would be left in the same dangerous state.

The total cost of these works, including expenses contingent upon their execution, Mr Mann estimated at 25,270 *l.* 15 *s.*

The subject of the reports of Sir J. Rennie and Mr. Mann was, I find, brought under your Lordships' notice in a report by the Commissioners of Woods and Works, dated the 24th November 1848, in which, after giving the particulars of

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In reply, the Commissioners appear to have received a letter from Sir C. Trevelyan, dated the 2d December following, in which they were informed that your Lordships sanctioned the expenditure of 150*l.* for the diversion of the Bayswater stream, but that your Lordships could not sanction the drawing off of the water, or any further proceedings, until plans and estimates of the expense of removing the mud from the Serpentine had been prepared and laid before your Lordships' Board.

I find that in this and the ensuing year (1849) the water in Kensington Gardens was lowered three feet. This proceeding had the effect of laying bare about one-third of the area of the bottom of the river in Kensington Gardens, adjoining the spot where the sewer joins the Serpentine. The mud was cleaned out, and the river was re-filled. An alteration was made in the dam of the Bayswater Brook, for the purpose of facilitating the passage of the water into the tunnel sewer, and thus more effectually preventing it from passing into the river, but no steps were taken for shutting it off altogether.

After this period nothing has been done for the improvement of the Serpentine.

Since the year 1836, when, as I have stated, the water in Kensington Gardens was cleansed, very extensive building operations have been carried on in Bayswater and its vicinity, and the population has become very large. The sewage which enters the Bayswater stream has consequently year by year increased, and thus the filth emptied into it from thousands of houses, and from the great cemetery at Kensal Green, which also drains into it, has been conveyed into the Serpentine; and this evil will, if speedy measures are not taken to abate it, become greatly increased, inasmuch as a new cemetery is about to be opened at Kilburn, where, in consequence of the retentive character of the soil, it will possibly be necessary that a drain should be made to each grave. The stream has also been covered over, and converted into a main sewer, known as the Ranelagh Sewer; and the tunnel sewer, which was constructed in 1834, for the purpose of diverting the sewage from the Serpentine, is now too small to bear away all the filth which is brought down to it by the larger sewer.

It thus appears that the subject of improving these waters has been constantly under consideration, but that the matter has never been dealt with in a proper spirit; for although the Commissioners of Woods and Works and your Lordships' Board had for years known that any steps that might be taken for cleansing the river would only temporarily alleviate the nuisance, unless the sewage water were entirely excluded, no effectual means have ever been taken for accomplishing that object, or for cleansing the waters in the portion of the river in Hyde Park. Had this course been adopted in the year 1836, or even in 1848, a great portion of the expense which it will be now necessary to incur, could have been saved.

Having instructed Mr. Mann to reconsider the estimate which he submitted to the Commissioners of Woods, &c., in 1848, so as to make it applicable to the present time, I have received from him two other estimates, copies of which I append for your Lordships' information.

Appendix (A.)
" (A 1.)

The first of these estimates contemplates the removal of the mud in the Serpentine, a portion of which it is proposed to apply in filling up holes, and in generally regulating the bottom of the river, if it should be found fit for the purpose, and thus to save the expense of carting it away.

When this has been done, Mr. Mann proposes that the bottom should be covered with a coating of concrete, nine inches thick, upon which should be laid a layer of bricks on edge, in Portland cement, after which the river might at any time be emptied, and the bottom cleansed.

The estimate also provides for the formation of a large brick drain through the embankment at the east end of the Serpentine, with permanent sluices for running off the water, and for cleansing the channel which runs from thence under Rotten Row to the sewer, and for improving the waters in Kensington Gardens.

The cost of these works, including the expense of laying down pipes to supply water for watering the roads, &c., and other contingencies during their execution, is estimated at 110,705 *l.* 18 *s.* 6 *d.*

Appendix (B.)
" (B 1.)

In the second estimate Mr. Mann confines his suggestions solely to the removal of the mud. The cost of this service, including the cost of the drain or tunnel for draining off the water, and other contingencies, would amount to 28,322 *l.* 12 *s.* 6 *d.*

Neither of these estimates provides for the cost of diverting the Ranelagh sewer from the Serpentine, a service which could best be executed by the Commissioners of Sewers, whose attention I have already called to the subject, and whose engineer has reported that the most simple and effective mode of carrying it out would be to construct a new sewer, eight feet in diameter, in a nearly direct line across Hyde Park to the main sewer, near Albert Gate, Knightsbridge. This sewer it is estimated would cost about 22,200 *l.*; but this expenditure the Commissioners state they have no funds to meet. It remains, therefore, to be considered whether some less expensive line cannot be devised, and whether this department ought not to contribute some portion of the cost, on the grounds upon which the arrangement of 1834, to which I have before referred, was based.

The foregoing remarks have reference solely to the Serpentine. I have, however, caused an estimate to be prepared by Mr. Mann of the cost of putting into a proper condition the lake in St. James's Park.

Nothing appears to have been done with the view of cleansing the water in this park since the year 1826, when the lake was partially emptied, and some of the mud was removed. I am informed that it was at that time intended to remove the whole of the mud, and to level the bottom; but the work appears to have been suddenly stopped; the bottom was left in an irregular state, and the water re-admitted. Since this period no steps have been taken for cleansing the lake, or improving the condition of the water, which is now in a filthy and unwholesome state, and, if possible, in a worse condition than the Serpentine.

Mr. Mann has prepared estimates for applying to this lake the same modes of cleansing and improvement as those which he has suggested in regard to the Serpentine. Copies of these estimates I likewise submit for your Lordships' information.

Appendix (C.)
Appendix (D.)

The cost of the works, according to the first estimate, which contemplates the removal of the mud, which averages 1 foot 9 inches in depth, and covering the bottom with concrete and bricks in cement, would amount to about 28,911 *l.* 13 *s.* 6 *d.* The cost of merely removing the mud, and regulating the bottom, according to the second estimate, would be about 10,033 *l.*

In addition to this expenditure, it would be necessary, before the lake could be emptied, to construct a sewer from it to the outlet of the Victoria sewer. This sewer would pass along Whitehall Place to the front of the Horse Guards, and from thence across the Parade in St. James's Park to the lake.

The cost of the first-mentioned portion of the sewer is estimated by the engineer of the Commissioners of Sewers at 1,680 *l.*, of which the Commissioners have expressed their readiness to contribute 800 *l.*; but they consider that as the sewer must necessarily be constructed at an increased depth, in order that it may be available as an outlet for the branch from the lake, the difference between that sum and the estimated cost of the work should be borne by this department. In this view of the case I concur with the Commissioners, and I would recommend your Lordships to sanction the amount as a charge upon this department.

The remaining portion of the sewer, from the lake to the front of the Horse Guards, would, it is estimated, cost about 2,420 *l.*, which I propose should also be defrayed by this department.

The whole of the works to which I have referred, could, I am informed, be completed in about two years from the present time. I am not, however, at present prepared to recommend to your Lordships either of the plans proposed.

I am

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I am inclined to think that the waters could be rendered and kept perfectly sweet and wholesome without the removal of all the mud, and without the use of bricks, by properly levelling the beds of the river and lake, allowing the mud to thoroughly dry, and covering it with properly prepared concrete. By the adoption of this mode of proceeding, the annoyance and inconvenience which would arise to the public during the removal of so large a mass of putrid matter would be prevented, and the danger to the public health, which it is to be feared would arise from the constant stirring up of so large a mass of filth, which must go on during the progress of the work, would be to a great extent avoided.

Another advantage in this plan would be, that if the work were well and carefully done, the beds of the waters would remain sound and hard for many years; the extent of the deposit of mud could at any time be easily seen, and, as occasion might arise, the waters could be let off, and the river and lake properly cleansed at a trifling cost.

Having now brought before your Lordships all the circumstances connected with the waters in St. James's and Hyde Parks, and having pointed out to your Lordships the only feasible modes of putting those waters into a wholesome state, and of preventing in future the effluvia arising from water impregnated with the filth of thousands of human dwellings, and with the decomposition of thousands of corpses, from being inhaled by the inhabitants of this metropolis, who resort to those places for healthful recreations, I feel that I cannot too strongly urge upon your Lordships' Board the absolute necessity of at once taking proper steps for putting an end to such nuisances; and I would suggest that I should receive your Lordships' authority to cause the waters to be let off during the present season, for incurring the expense of constructing such drain and sewers as may be found necessary for that purpose, and for such other works as may be incidental to these proceedings. I shall be then enabled carefully to consider what course it will be best to adopt, not only for the cleaning and future maintenance of the waters in a proper state, but also for obtaining a plentiful supply of pure water, and to submit to your Lordships more accurate estimates of the costs of the works, to be laid before Parliament next Session.

It must be recollected that in each year there is additional accumulation of mud and filth; and that if the works had been done when first suggested, the expense would have been much less than it will be now.

I have made no mention of the lake in Buckingham Palace Gardens, because I have already received your Lordships' authority, by Mr. Wilson's letter of the 10th July 1855, for having it put into a proper state, which I will cause to be done at the earliest favourable opportunity.

I am, &c.
(signed) *B. Hall.*

The Right Honourable
The Lords Commissioners of Her Majesty's Treasury.

APPENDIX.

APPENDIX.

Appendix (A.)

BASIN IN KENSINGTON GARDENS.

Appendix (A).

ESTIMATE of the Expense of cleaning out MUD from the BASIN in Kensington Gardens, regulating and covering Bottom with BRICK on CONCRETE, and forming an Island in the Centre of same.

	£.	s.	d.	£.	s.	d.
15,505 cubic yards mud, &c., taken from bottom, used in forming an island in centre of basin, and otherwise disposed of in filling in holes in the gardens, at 1*s.* 6*d.*	787	17	6			
660 feet run of 1½ brick wall in cement, seven feet high, backed with concrete, two feet average thickness, as in drawing No. 1, at 12 *s.* - - - - - -	396	–	–			
1,500 cubic yards mould to surface of island for growth of shrubs, at 3 *s.* - - - - - - - -	225	–	–			
750 feet run 12-inch drain to empty basin, at 2*s.* 6*d.* -	93	15	–			
7,878 cubic yards concrete to cover bottom of basin nine inches thick, at 6*s.* - - - - - - - -	2,363	8	–			
31,515 yards superficial brick on edge in Portland cement, to bottom of basin, at 4 *s.* - - - - - -	6,303	–	–			
2,180 feet run of 9-inch brick wall, in cement to edge of water, three feet high, excavation and concrete, at 3*s.* 1*d.* - - - - - - - - - - -	336	1	8			
				10,505	2	2

Appendix (A. 1.)

SERPENTINE.

Appendix (A 1).

ESTIMATE of the Expense of cleaning out MUD from the Serpentine in Hyde Park and Kensington Gardens; enlarging and improving that portion in Kensington Gardens; regulating and covering Bottom with Brick on Concrete.

	£.	s.	d.	£.	s.	d.
140,000 cubic yards mud wheeled out and carted away, finding shoot, &c., at 3*s.* 3*d.* - - - - - -	22,750	–	–			
Forming drain or tunnel about 25 feet superficial area, through embankment at east end, to allow water to run off, tending same and forming channel in mud to allow of its draining off water during the progress of the works, and providing sluices, &c., for permanent use	2,000	–	–			
95,000 cubic yards clay and gravel excavated in the alteration of Serpentine in Kensington Gardens, including the removal of materials in the bottom of the river for the regulation of the same, and lowering the banks in Kensington Gardens to the proper slopes and levels, at 2*s.* 6*d.* - - - - - - - - - - -	11,875	–	–			
54,000 cubic yards of concrete to cover bottom nine inches thick, at 6 *s.* per yard - - - - - -	16,200	–	–			
10,900 feet run brick wall in cement, nine inches thick, three feet high, round margin of water, including excavating and making good ground, and backing with concrete where required, at 2*s.* 1*d.* - - - - -	1,680	8	4			
215,977 yards superficial brick on edge, laid in cement, to cover entire bottom of Serpentine, at 4*s.* - -	43,195	8	–			
Cleaning out mud from and paving bottom and sides with brick, including retaining wall, and coping in stone the channel from waterfall at east end to sewer under Rotten Row - - - - - - - - -	500	–	–			
Laying down 12-inch main to supply water to pumps and stand posts, during the progress of the works, that at present derive their supply from the Serpentine -	2,000	–	–			
				100,200	16	4
			£.	110,705	18	6

Appendix (B.)

Basin in Kensington Gardens.

Appendix (B).

ESTIMATE of the Expense of cleaning out the Mud from the Basin in Kensington Gardens, and forming an Island in the Centre of same.

	£.	s.	d.	£.	s.	d.
15,505 cubic yards mud, &c., taken from bottom, and used in forming an island in the centre of basin, and otherwise disposed of in filling up hollows in the gardens, at 1 *s.* 6 *d.* - - - - - - - -	787	17	6			
660 feet run of 1¼ brick wall in cement, seven feet high, backed with concrete, two feet average thickness, at 12*s.* - - - - - - - - - - - -	396	–	–			
1,500 cubic yards mould to surface of island, for growth of shrubs, at 3*s.* - - - - - - - - -	255	–	–			
750 feet run 12-inch drain to empty basin, at 2*s.* 6*d.* -	93	15	–			
				1,502	12	6

Appendix (B. 1.)

Serpentine.

Appendix (B 1).

ESTIMATE of the Expense of cleaning out Mud from Serpentine, providing means of drawing off Water, and laying down Pipes to supply Water to Pumps, Stand Posts, &c., during the execution of the Works, &c.

	£.	s.	d.	£.	s.	d.
140,000 cubic yards mud, &c., wheeled out, carted away, finding shoot, &c. - - - - - - - - -	22,750	–	–			
Forming drain or tunnel 25 feet superficial area, through embankment at east end, to allow water to drain off; tending same, and forming channels in mud to allow the water to drain off during the progress of the works, providing sluices, &c., for permanent use - - -	2,000	–	–			
Cleaning out mud from channel extending from waterfall at east end to sewer under Rotten Row - - -	70	–	–			
Laying down 12-inch main to supply water to pumps and stand posts during the progress of the works, that at present derive their supply from the Serpentine -	2,000	–	–			
				26,820	–	–
£.				28,322	12	6

Appendix (C.)

Lake in St. James's Park.

Appendix (C).

ESTIMATE of the Expense of cleaning out the Mud from the Lake in St. James's Park, paving the Bottom with Brick in Cement on Concrete.

	£.	s.	d.
4,300 cubic yards mud, providing tram road, drawing out mud to east end of lake, carting away and finding shoot, at 4*s.* - - - - - -	8,600	–	–
Regulating and levelling bottom - - - - - - - - - -	1,433	–	–
16,191 cubic yards concrete to cover bottom nine inches thick, at 6*s.* -	4,857	6	–
64,765 yards superficial brick on edge, laid in cement, to cover bottom, at 4*s* - - - - - - - - - - - - - - - -	12,953	–	–
6,930 feet run brick wall in cement, nine inches thick, three feet high, round margin of water, including excavating and making good ground, and backing with concrete where required, at 3*s.* - - - - - -	1,068	7	6
£.	28,911	13	6

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Appendix (D.)

Lake in St. James's Park.

ESTIMATE of the Expense of cleaning out the Mud from the Lake in St. James's Park, regulating Bottom, &c.

	£.	s.	d.
43,000 cubic yards mud, providing tramroad, and drawing out mud to east end of lake, carting away and finding shoot, &c., at 4 s. - -	8,600	–	–
Regulating and levelling bottom of lake - - - - - - -	1,433	–	–
£.	10,033	–	–

Sir, Treasury Chambers, 3 November 1855.

I am commanded by the Lords Commissioners of Her Majesty's Treasury to acquaint you that they have given their attentive consideration to the subject of cleansing the waters in Hyde Park, St. James's Park, and Kensington Gardens, referred to in your report of the 12th ultimo.

I have to state that, in the opinion of their Lordships, the point of first importance in the matter is to provide in as economical a manner as may be practicable for the effectual diversion of the sewage matter from the Serpentine, which appears to be the main cause of the pollution of the water in that river, and also in the lake in St. James's Park, and they trust that you will give your serious attention to that point before any measures are taken for the improvement of the bed of the waters. But in the meantime, as the draining of the waters will be a necessary preliminary to any ulterior works for the improvement of their condition, my Lords are pleased to authorise you to incur such expense as may be necessary for the construction of the proposed drain and sewers in connexion with the lake in St. James's Park.

I am, &c.
(signed) *James Wilson.*

The First Commissioner of Works, &c.

My Lords, Office of Works, &c., 13 August 1856.

On the 12th October last I addressed a report to your Lordships, setting forth the arrangements made in the year 1834 for diverting the contents of the Bayswater Sewer from the Serpentine River in Hyde Park, the measures taken in 1836 and 1837 for removing the mud from that river, and I detailed the various steps proposed in regard to the general improvement of the river up to the date at which I wrote.

I acquainted your Lordships that I had instructed the superintendent of the Parks to reconsider the estimate which he had submitted in 1848, and I transmitted the estimate prepared in consequence of my directions. This estimate contemplated the removal of the mud in the Serpentine, covering the bottom with a thick coating of concrete, forming a large brick drain through the embankment at the east end, with permanent sluices for running off the water, and amounted to 110,705*l.* 18*s.* 6*d.*

I at the same time forwarded another estimate, which was limited solely to the removal of the mud. The cost of this service, including the expense of the tunnel for draining off the water, amounted to 28,322*l.* 12*s.* 6*d.*

Having made some further observations with reference to the Serpentine River, I then proceeded to report on the state of the lake in St. James's Park, and I informed your Lordships that, since 1826, when a portion of the mud had been removed, nothing had been done with a view of cleansing the water. I submitted two estimates, which had been prepared by the park superintendent, one amounting to 28,911*l.* 13*s.* 6*d.* for removing the mud, and covering the bottom with concrete and cement; the other, amounting to 10,033*l.*, for merely cleaning out the mud, regulating and levelling the bottom of the lake.

I at the same time informed your Lordships that it would be necessary, before the lake could be emptied, to incur an expenditure of 4,100*l.* in constructing a

Correspondence. sewer from it to the outlet of the Victoria Sewer (800 *l.* of which sum the Commissioners of Sewers had assented to pay).

By Mr. Wilson's letter of the 3d November 1855, this Board was authorised to incur such expense as might be necessary for the construction of the proposed drain and sewer in connexion with the lake above mentioned, and I was at the same time requested by your Lordsdips to give my serious attention to provide in as economical a manner as practicable for the effectual diversion of the sewage matter from the Serpentine, which appeared to be the main cause of the pollution of the water in that river.

I have given this point serious consideration, and I have seen the engineer of the Metropolitan Board of Works on the subject. He informs me that the diversion of the sewage from the Serpentine will form a part of the plan for the main drainage of the metropolis, which plan will be submitted to me very shortly, and must receive my approval before it can be acted upon.

The outfall sewer from the lake in St. James's Park was completed last spring, and the water may now be run off at any time.

I am strongly of opinion that the great work of cleansing the Serpentine and the water in St. James's Park, should be proceeded with in the month of October next, and I hope that I may receive your Lordships' sanction to commence it at that period.

I am, &c.
(signed) *B. Hall.*

The Right Honourable the Lords Commissioners
of Her Majesty's Treasury.

Sir, Treasury Chambers, 20 August 1856.

The Lords Commissioners of Her Majesty's Treasury have had before them your letter, dated the 13th instant, on the subject of cleansing the Serpentine and the water in St. James's Park; and I am directed to state to you, that my Lords learn with satisfaction that the Metropolitan Board of Works will undertake measures for diverting the sewage from the Serpentine.

Their Lordships concur with you in opinion as to the desirableness of taking early measures for cleansing that water and the canal in St. James's Park; but adverting to the great cost of that work, amounting, according to the estimates submitted by you, to 38,355 *l.* 12 *s.* 6 *d.*, for which no provision has been made in the Parliamentary Grant, my Lords will be glad to be informed of the course which you propose on the subject.

I am, &c.
The First Commissioner of Works, &c. (signed) *C. E. Trevelyan.*

Sir, Palace Entrance, 25 August 1856.

Adverting to my former report on the subject of cleansing and improving the waters in Hyde and St. James's Parks and Kensington Gardens, for which estimates were submitted to the First Commissioner of Her Majesty's Works, &c., in September last, I beg most respectfully to report, that the season is now arrived when it will be desirable to commence these works.

I would therefore beg to suggest that means be adopted for drawing off the water, as suggested in my report, dated 14th September last, and that the bottom be regulated in accordance with the plans and sections accompanying my reports and estimates before alluded to.

In this arrangement it is not intended that any of the mud should be carted away, but, after being properly drained, that it should be used in regulating the bottom, hot lime being used to prevent any unpleasant smell arising therefrom. The bottom of these waters is in a most uneven and irregular state, and much labour will be required to put it in a proper state; and unless this is done, but little or no improvement can be effected.

After the bottom has been properly regulated, I propose applying a coating of concrete, from 9 to 12 inches in depth, over the entire bottom. This will form a hard, smooth and durable bottom, and prevent the water from coming in contact with any deleterious substance.

I also propose, that at the same time as these improvements to the Serpentine are proceeding, a broad gravel walk should be formed along the north side of the Serpentine, between the water and the carriage-drive, not less than 40 feet in width. This accommodation is much required, this being the principal promenade on Sundays for pedestrians.

I propose to dispense with the brick bottom, which, although very desirable, adds greatly to the expense; there can be no doubt that the brick bottom is the best, although the concrete may do very well alone, and will be equally good as far as the purity of the water is concerned.

It will be necessary to provide the means for supplying the water for the watering of the roads and footpaths during the time these works are on hand. I am of opinion that the best and most economical mode of doing so would be to come to some arrangement with the Chelsea Waterworks Company for retaining, either temporarily or permanently, the basin which they propose to abandon in Hyde Park, with the mains therewith connected. If this were done, the Company could deliver the necessary supply of water into the basin, and, the pipes being connected, a supply of water would be obtained for watering the Green and St. James's Parks; and if a pipe were laid on from Hyde Park Corner along the carriage drive on the north side of the Serpentine, and from Hyde Park Corner to Albert Gate, this, with the tanks now supplied by the Chelsea Company, would suffice for the watering of Hyde Park.

These works are extensive, and will require time to execute them in a proper manner. I am of opinion that little short of two years will be necessary to complete the whole.

I beg to annex an estimate of the expense of the several services; viz.—

	£.	s.	d.
Lake in St. James's Park - - - - -	11,685	–	–
The Serpentine - - - - - - -	45,130	–	–
Basin, Kensington Gardens - - - - -	4,200	–	–
	£. 61,015	–	–

I have, &c.
(signed) *J. Mann.*

G. Russell, Esq., Assistant Secretary.

My Lords, Office of Works, &c., 25 August 1856.

I beg to acknowledge the receipt of your Lordships' letter of the 20th instant, in which your Lordships are pleased to concur with me in the opinion expressed in my report of the 13th instant, of the desirableness of taking early measures for cleansing the Serpentine River and the Lake in St. James's Park, and in which, adverting to the fact that no provision has been made by Parliament for the expense of these services, you request to be informed of the course which I propose on the subject.

In reply, I beg to submit for the information of your Lordships the accompanying copy of a report which I have this day received from the superintendent of Hyde Park, &c. on the subject.

Your Lordships will perceive that the total sum estimated as the cost of this service is a large one; but I believe that, in order that this important work may be executed as it ought to be, no smaller sum will suffice.

Parliament not having as yet made any provision for this service, I can only represent the importance of it, and submit the matter for your Lordships' most favourable consideration.

In the event of your Lordships not being prepared to furnish at present the funds necessary for the whole of the services for which Mr. Mann has prepared an estimate, I would submit to your Lordships the importance of the work required to be done to the lake in St. James's Park. This service is even more urgent than that required for the Serpentine River, and if it were proceeded with

Correspondence.

with at once, the latter might, should your Lordships deem it expedient, be postponed until next year.

I am, &c.
(signed) *B. Hall.*

The Right Honourable the Lords
Commissioners of Her Majesty's Treasury.

Sir, Treasury Chambers, 27 August 1856.

The Lords Commissioners of Her Majesty's Treasury have had before them your further report of the 25th instant, enclosing a report from the superintendent of Hyde Park, on the subject of the measures for cleansing the Serpentine, the basin in Kensington Gardens, and the lake in St. James's Park, and the amount that will be required for this purpose, and their Lordships have directed me to state that they are unable to advance the large amount required for the whole service contemplated, namely, 61,015 *l.*; but their Lordships are pleased to authorise you to undertake at once the work proposed for cleaning the lake in St. James's Park, and they will be prepared to make such advance as may be necessary for the purpose, in anticipation of a vote to be taken in the estimates to be laid before Parliament in the next Session.

I am, &c.
The First Commissioner of Works, &c. (signed) *G. Arbuthnot.*

REPORT, Microscopical and Chemical, on the Water of the Serpentine.

Sample (A.)

Taken from near the Bayswater end where the water enters in Kensington Gardens; collected 20th May 1857, by Mr. Mann.

Report of Dr. Hassall.

This water was dull and opalescent, and did not become clear on being allowed to remain at rest for some days; it was of a dirty yellowish green colour; much sediment was deposited from it, and a green scum of vegetable matter collected upon its surface in the course of a few hours; lastly, many living *Entomostraceæ* were plainly visible to the naked eye actively moving about in the water.

The water, after the deposition of the sediment, examined with the microscope, was found to contain numbers of brown and green actively moving sporules of *confervæ* and *infusoriæ*, a numberless threads of a conferva, *aphanizomenon flos-aquæ*, as well as many animalcules or *infusoriæ*.

The sediment subjected to microscopical examination was ascertained to consist partly of earthy matter and partly of dead and decaying organic matter, as well as of large numbers of living organic productions, including different genera and species of *conferveæ*, *desmideæ*, *diatomaceæ*, *fungi*, *entomostraceæ*, *annelidæ*, and *infusoriæ*. The principal forms of these productions observed are represented in fig. A; they include amongst the confervæ, *aphanizomenon flos-aquæ*, and threads of *oscillatoria*; amongst the desmideæ, *sceuedesmus* and *pediastrum*; amongst the diatomaceæ, species belonging to the genera *amphora*, *cymatopleua*, cyclotella, navicula, nitzschia, and pleurosigma; amongst the entomostraceæ, *cyclops quadricornis;* amongst the annelidæ, anguillula fluviatilis; and amongst the infusoriæ, species representing the following genera, *brachionus*, *paramecium*, *coleps*, *layenella*, *euglena*, *actinophrys* and *monas*.

The chemical examination of this water furnished the following results. The residue left on evaporation presented a dirty appearance, and was of a brown colour, and which on ignition changed to black, indicating the presence of a considerable amount of organic matter.

The

Report of Dr. Hassall.

The solid contents of an imperial gallon of this water amounted to 29·64 grains, the composition of which was as follows:—

(A.)

Contents of Imperial Gallon.

Carbonate of lime	8·78
Sulphate of lime	5·81
Sulphate of soda	3·01
Chloride of sodium	4·80
Silicic acid	1·24
Ammonia, much.	
Nitrates, none.	
Organic matter	6·00
	29·64 grains.

SAMPLE (B.)

Taken from the East end of the Serpentine in Hyde Park, near the pipe which formerly conveyed the water to the lake in St. James's Park; collected 20th May 1857, by Mr. Mann.

THIS water presented nearly the same physical charisteristics as the first sample, that is, it was dull and opalescent, not becoming clear even after remaining at rest for a considerable time; it was of a dirty yellowish green colour, the green tint being more decided, and a thicker scum of vegetable matter rose to the surface; lastly, numerous *Entomostraceæ* were seen swimming about in the water.

The water, after the deposition of the sediment, examined with the microscope, was seen to contain many green and brown *sporules* of *confervæ* and *infusoriæ*, a larger number of *animalcules,* and a greater abundance of the threads of *aphanizomenon flos-aquæ.*

The sediment deposited was considerable, although less than in sample (A.); it contained, however, a much greater number of animalcules or *infusoriæ;* indeed it might be stated that it swarmed with them, the predominant species being the large *Paramecium* exhibited in fig. B., and of which there were some hundreds; the stomachs of some of these contained portions of the threads of the *aphanizomenon,* upon which they had been feeding; there were also present large numbers of the curious annelid or worm named *spirostomum ambiguum.* The Entomostraceæ most abundant in the water was a species of *daphnia*, exhibited in fig. B.

The residue of the evaporated water presented the same discoloured and brown appearance, attributable mainly to the presence of much organic matter.

The solid contents of an imperial gallon of this water amounted to 29·04 grains, the composition of which was as follows:—

(B.)

Contents of Imperial Gallon.

Carbonate of lime	9·44
Sulphate of lime	3·09
Sulphate of soda	4·29
Chloride of sodium	4·90
Silicic acid	·92
Ammonia, much.	
Nitrates, none.	
Organic matter	6·40
	29·04 grains.

Report of Dr. Hassall.

The general results deducible from these examinations are as follow:—

That these waters, taken from opposite extremities of the Serpentine, are both very bad, containing much organic matter, vegetable and animal, dead, living, and in solution.

The presence of a large quantity of organic matter is proved alike by the microscopical examinations and the chemical analyses.

The microscopical examinations show that they both abound in living organic productions, belonging to various divisions of the vegetable and animal kingdoms, as DIATOMACEÆ, DESMIDEÆ, CONFERVEÆ, FUNGI, ENTOMOSTRACEÆ, ANNELIDÆ, and INFUSORIÆ.

Although by means of chemistry we cannot determine either the state in which the organic matter exists in water, or the forms assumed by it, yet chemistry enables us to arrive at a close approximation to the actual quantity of that matter present in any water; and in the case of the waters of the Serpentine, the chemical analyses made prove that they both contain a large amount of organic matter, to the presence of which the unwholesomeness of most waters is to be assigned.

The state of sample (B) was much worse than that of sample (A); this was clearly shown, first, by the greater abundance of infusoreæ, and other forms of living animal productions contained in it; second, by the presence of a great many examples of the worm or annelid, named *spirostomum ambiguum*, and which, so far as my experience extends, is met with only in waters of a high degree of impurity; and, third, by the larger amount of organic matter contained in it, as proved by the chemical analysis.

Both the waters contained much of the vegetable production, or conferva, *aphanizomenon flos-aquæ;* it was to it that the green hue of these waters was owing, and it is to this plant that the bright green coloration of the waters of the Serpentine, so frequently observed at different times, has been due. That such minute vegetable productions should be capable of vividly colouring such large masses of water is remarkable. It is to a vegetable production of the same class that the coloration of the Red Sea is due.

The condition of sample (B) represents, then, very closely that of the water with which the lake in St. James's Park was formerly supplied; the results, therefore, of the present examinations and analyses of the water of the Serpentine prove clearly the necessity which existed for some efficient steps being taken to improve the water supply of the lake. That the plans now in course of execution in St. James's Park, under the direction of Sir B. Hall, will result in a very greatly improved state of the supply, especially if the lake be filled with water from the recently formed well, does not admit of a doubt.

The water of the Serpentine being shown to be full of impurities, it will not be out of place, in connexion with the present report, to consider the steps required to remedy the present highly unsatisfactory condition of the water supply of the Serpentine.

From a full consideration of the matter, from a knowledge of the conditions necessary to secure the purity of water, derived from much experience, I am decidedly of opinion that it would be scarcely possible to devise means more efficient for the attainment of the object in view than those now being carried out in the case of the lake in St. James's Park.

What, therefore, appears to me to be necessary is, that the Serpentine should be emptied, and all the black and putrid mud, the collection of the impurities of years, removed; that the bottom should be levelled, rendered more shallow, and of one uniform depth of about 4 ½ feet; that it should be covered with concrete; and, lastly, that it should be supplied with pure spring water, arrangements being made with the water companies for a temporary supply of water in the event of the supply from the springs falling short at any time.

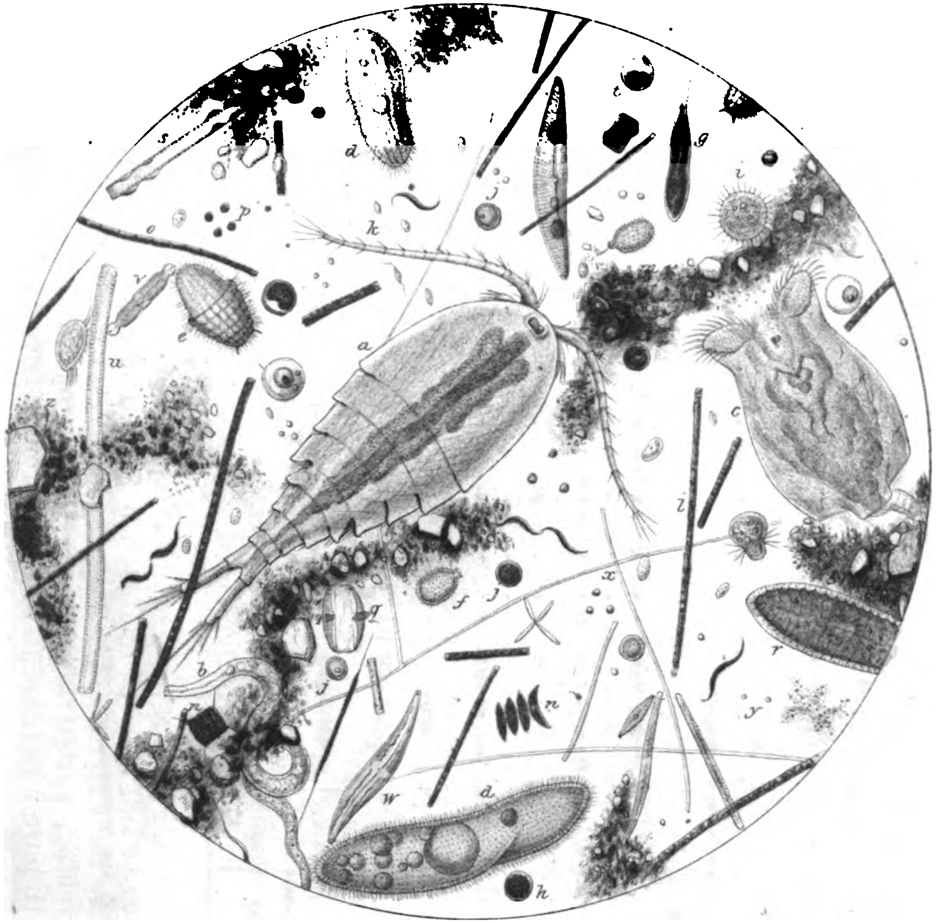
The removal of the black and putrid mud is absolutely essential; for were it suffered to remain, and were the Serpentine filled with the very purest water, it would speedily become contaminated and spoiled by contact with the mud in question.

The concreting of the bed of the Serpentine is equally essential, for, the water being let off, the bed might then be periodically swept and cleansed, by which alone the water could be kept in the necessary state of purity.

The levelling, partial filling-up of the bottom of the Serpentine, and its supply with pure water, are to be most strongly advocated, not only on sanitary grounds

From WATER of SERPENTINE (A)

Taken from the upper portion of the Serpentine

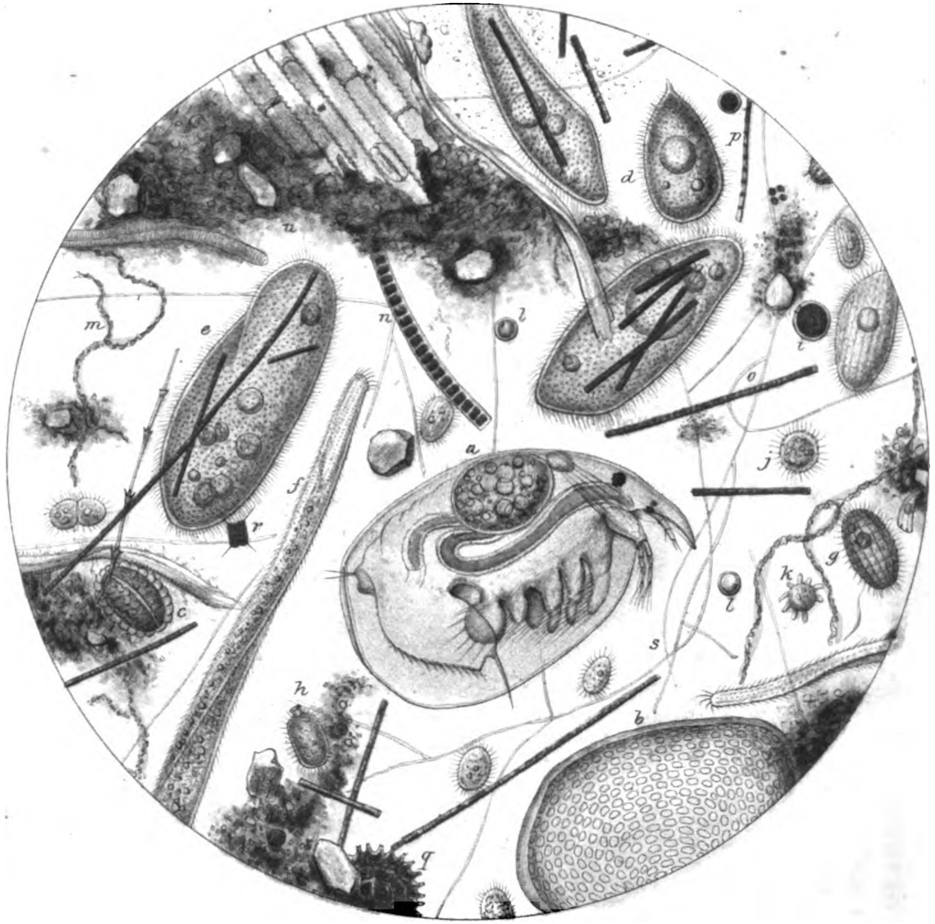


a. Magnified 75; the remainder 200 Diameters.

a. Cyclops quadricornis.
b Anguillula fluviatilis.
c Brachionus pala.
d Paramæcia.
e Coleps hirtus.
f Lagenella.
g Euglena v
h Green animalcules, most rapid.
i Actinophrys
j. Brown lenticular moving bodies.
k. Monads.
l. Aphanomizenon flos-aquæ.
m. Pediastrum.
n. Scenedesmus.
o. Oscillatoria.
p. Green sporules.
q. Amphora ovalis.
r. Surirella.
s. Cymatopleura Solea.
t. Cyclotella operculata.
u. Nitzschia sigmoidea.
v. Navicula.
w. Pleurosigma lacustre.
x Slender fungus.
y Colourless sporules.
z. Grit & organic debris.

From WATER of SERPENTINE (B)

Taken from a spot near the mouth of the pipe which conveyed the water to the lake in St James's Park.



a.b. Magnified 75; the remainder 200 Diameters

a. Daphnia .... ?
b. Cypris.
c. Ovum of Cypris?
d. Paramœcia.
e. Bursaria.
f. Spirostomum ambiguum.
g Coleps hirtus
h. Lagenella.
i. Green animalcules, motion most rapid.
j. Actinophrys.
k. Amœba.
l. Brown lenticular moving bodies.
m. Stem of Anthophysa.?
n. Ulva.
o Aphanomizenon flos-aquæ.
p Oscillatoria.
q. Pediastrum.
r. Scenedesmus
s. Slender fungus.
t. Green sporules.
u. Grit & organic debris, as Wheat Straw, Spiral Vessels, Fragment of feather, &c.

Dr A H Hassall Dir

Tuffen West Del et Lith.

Report of Dr. Hassall.

grounds, but on that of humanity. Not only would bathers resort to the Serpentine in greater numbers, and with more advantage to their health, not only would the atmosphere near the water be purer and more healthful, but the lives of hundreds of persons would eventually be saved. The services of that most useful and praiseworthy society, the Royal Humane Society, might in that case, so far as the St. James's and Hyde Parks are concerned, be dispensed with, and their exertions transferred to other places more in need of their aid.

(signed) *Arthur H. Hassall*, M.D., F.L.S.,
Member of the Royal College of Physicians,
Author of "Food and its Adulterations,"
"Adulterations detected," &c.

Bennett Street, St. James's Street,
May 1857.

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5. COPY of any ORDER or AUTHORITY under which PAYMENTS have been made by the Paymaster-General for such WORKS, and the Date of such Payments.

As regards the sum of 3,636 *l.* 14 *s.* 2 *d.* for labour, &c. (p. 2), the same was paid in weekly sums by the Paymaster-General to the Superintendent of the Park (under whom the works were carried on), between the 12th September 1856 and the 16th May 1857, both inclusive, upon weekly Orders from this Board.

As the Board had to make other weekly payments to the Superintendent, on account of the Royal Parks, through the Paymaster-General, these and the payments on account of the Lake in St. James's Park were comprised in one sum in the weekly Orders given by the Board to the Paymaster-General, separate accounts being kept by the Superintendent, that for the Lake amounting to the above sum of 3,636 *l.* 14 *s.* 2 *d.*

As regards the sum of 1,877 *l.* 1 *s.* 10 *d.* for horse hire, &c. (p. 2), the following are copies of the Orders for payments given by this Board to the Paymaster-General.

(No. 246.)

SCHEDULE of ORDERS for PAYMENTS to be made by Her Majesty's Paymaster-General on behalf of the Commissioners of Her Majesty's Works and Public Buildings.

Reference Number.	To whom Payable.	Vote or Service to which Chargeable.	Particulars.	Amount. £.	s.	d.
3193	John Archbutt - - -	Royal Parks, &c. -	For tallow, oil, &c.	–	12	1
3194	James Chadwick - -	- ditto - -	For lime, &c. -	153	15	–
3195	John Darke - - - -	- ditto - -	Horse hire, &c. -	1	14	–
3196	Edwin J. Kendall - -	- ditto - -	For boots - -	15	–	–
3197	Charles Hart - - -	- ditto - -	- ditto - -	13	16	–
3198	Thomas Haynes & Sons -	- ditto - -	For scoops - -	2	5	–
3199	James Simpson - - -	- ditto - -	Engineer - -	3	5	10
			£.	190	7	11

Office of Works, &c.
4 November 1856.

(signed) *G. Russell*,
In the absence of the First Commissioner and Secretary.

(Nos. 452 and 453.)

SCHEDULE of ORDERS for PAYMENTS to be made by Her Majesty's Paymaster-General, on behalf of the Commissioners of Her Majesty's Works and Public Buildings.

Reference Number	To whom Payable.	Vote or Service to which Chargeable.	Particulars.	Amount.		
				£.	s.	d.
4865	John Archbutt	Royal Parks, &c.	For oil, &c.	2	9	–
4866	Aylesford Pottery Company, per Fred. Walcot Reynell.	ditto	For drain pipes	276	6	8
4867	James Chadwick	ditto	For lime, &c.	16	3	9
4868	John Darke	ditto	Horse hire, &c.	78	16	–
4869	Hy. Doulton & Co.	ditto	Drain tiles	63	17	11
4870	Thos. Haynes & Sons	ditto	For scoops	1	–	–
4871	Edwin J. Kendall	ditto	Water boots	14	10	–
4872	Francis M'Neill & Co.	ditto	Asphalted felt	6	18	4
4873	James Simpson	ditto	Engineer	3	6	10
4874	Thomas Street	ditto	Level, &c.	18	7	–
4875	George Smith	ditto	For deals	10	3	6
			£.	486	14	–

Office of Works, &c.
4 March 1857.

(signed) *Alfred Austin,*
In the absence of the First Commissioner.

(No. 55.)

SCHEDULE of ORDERS for PAYMENTS to be made by Her Majesty's Paymaster-General, on behalf of the Commissioners of Her Majesty's Works and Public Buildings.

Reference Number.	To whom Payable.	Vote or Service to which Chargeable.	Particulars.	Amount.		
				£.	s.	d.
419	John Archbutt	Royal Parks, &c.	For tallow, &c.	1	4	5
420	The Aylesford Pottery Company, per Frederick Walcot Reynell.	ditto	Drain pipes	284	13	6
421	John Darke	ditto	Horse hire, &c.	29	14	–
422	Peter Davey & Son	ditto	For coals	–	19	10
423	John Davis	ditto	For sand screens	10	10	–
424	George Ell	ditto	For barrows	46	–	–
425	Jas. H. S. Farebrother	ditto	Hire of tarpaulins	–	13	4
426	Geo. B. Kent & Co.	ditto	For yokes	1	4	–
427	John Morley	ditto	For furze	117	10	–
428	Mark Patrick & Son	ditto	For lime and ballast	511	14	7
429	Francis Read	ditto	For shingle	7	10	–
430	James Simpson	ditto	Use of engine, &c.	145	–	–
431	George Smith	ditto	For deals	43	6	3
			£.	1,199	19	11

Office of Works, &c.
28 April 1857.

(signed) *Alfred Austin,*
In the absence of the First Commissioner.

Office of Works, &c.
17 June 1857.

B. Hall,
First Commissioner of Her Majesty's Works and Public Buildings.

ST. JAMES'S PARK.

RETURN of the SUMS Expended for the Alterations in the LAKE in ST. JAMES'S PARK; and Copy of the CORRESPONDENCE between the Board of Works and the Treasury respecting such Expenditure.

(*Sir Francis Baring.*)

REPORT made to the First Commissioner of Works upon the State of the WATER from which the LAKE in ST. JAMES'S PARK was supplied.

(*Sir Benjamin Hall.*)

Ordered, by The House of Commons, *to be Printed,*
9 *June* 1857.

86—Sess. 2. +

Under 3 *oz.*

RIVER THAMES.

RETURN to an Order of the Honourable The House of Commons, dated 4 August 1857;—*for*,

COPIES "of CORRESPONDENCE between the First Commissioner of Works and Mr. *Goldsworthy Gurney*, and the Commissioners of Sewers and the Board of Works, on the State of the River Thames, and the Pollution of the Atmosphere on the Banks of the Thames and the Houses of Parliament."

Sir, House of Commons, 25 May 1857.

IN conformity with your request, through Mr. Speaker, I beg to forward a report "on the state of the sewers in the neighbourhood of the Houses of Parliament, pointing out the existing nuisances, and stating the manner in which I think those nuisances may be remedied."

That the effluvia, escaping from the open mouths of these sewers, taint the atmosphere in and about the Houses of Parliament, is within the daily experience of the Members of both Houses; and there cannot be the least doubt that the effect upon the health of all subject to their influence is injurious.

For some years previous to 1854 the atmosphere of both Houses of Parliament was often impregnated with the most offensive odours; the Courts of Law were at one period so much affected that the judges were compelled to rise and leave the courts. Various causes were assigned for the annoyance; amongst the rest, exhalations from St. Margaret's churchyard, imperfect drains under the buildings, &c. The nuisance was at length complained of, and the subject brought before the House of Commons; in consequence, I was requested by the late Sir William Molesworth to investigate it.

On close inquiry, I ascertained that the source of the evil arose from untrapped gully-holes in St. Margaret's-street, New Palace-yard, and from the open mouth of Bridge-street sewer, which discharged itself at this end of Westminster Bridge.

I recommended that the gully-holes should be immediately trapped, as well as the mouth of the sewer; and that the effluvia, pent back, should be withdrawn and destroyed by special means. I submitted to the First Commissioner of Works the best mode, in my opinion, of effecting these objects. My suggestions, having met with the approval of Sir William Molesworth, were carried out, so far as the sewers were concerned, by the Commissioners of Sewers, to whom a communication was made by Lord Palmerston; and the other arrangements were at the same time carried out, under the direction of Sir William Molesworth. The means above referred to are detailed in a report I was requested to make to the Office of Works, "on experiments for withdrawing and decomposing the gaseous effluvia from the sewers in the neighbourhood of the Houses of Parliament;" it was presented to the House 8th January 1855, and printed on the 6th March following. Sessional No. 105. To this report I have the honour to refer you.

On completion, the above arrangements were found successful in removing the nuisance; the annoyance complained of suddenly ceased, and from that period to the present, no complaints whatever have been made, either in the Courts of Law or in the Houses of Parliament.

Although the greater nuisance was removed, the minor annoyance, to which my present report refers, was suffered to remain. It was pointed out in my report of 1855, page 3. It will be observed, on reference to this report, that I recommended the open mouths of some sewers on the opposite side of the river, and others on this, to be trapped; had this been done, I believe the impurity of the air now complained of would not exist. The principal reason why it was not done at the time, I believe, was on account of a fear expressed by the Commissioners of Sewers, that if the open mouths of the sewers on the

Thames were trapped, the effluvia would be pent back, and escape into the streets. Experience has now demonstrated that this fear need not have been entertained, for it is in evidence that the great Bridge-street sewer has been trapped ever since 1854, and no such evil has arisen; indeed, as a further proof of success, it may be stated that the outfall has now been carried out under low-water mark by the Commissioners of Sewers, and is permanently sealed. The mouth of the great Victoria sewer, from Pimlico, going up Parliament-street and Whitehall, is also trapped: the mouth or outfall is carried out under low-water mark at Hungerford Bridge. If any evil had arisen from trapping these sewers (and they are large ones), it would have been discovered and complained of long before this. It is manifest, trapping the mouths of any sewers about the Houses of Parliament may be effected with impunity.

I will now proceed to "specify the position of the sewers which affect the impurity of the atmosphere in and about the Houses of Parliament," and also some other sources of impurities to which my report has reference.

At the pier, contiguous to Lambeth Palace, there are two sewers untrapped; two at Millbank; one at the Penitentiary; two at Vauxhall Bridge; one on either side of the river. Of these, the most offensive to the Houses of Parliament are the sewers at Lambeth and Millbank. The others affect the atmosphere only in south-westerly winds, and on the fall of the barometer. They do not require such immediate attention; but it is desirable that the Lambeth and Millbank sewers should be trapped as soon as possible.

There are nuisances affecting the atmosphere of the Houses of Parliament, on the other side of the river, from offensive manufactories; the worst are the bone manufactories. The effluvia from the other side constantly finds its way to this, and is very offensive.

The exhalations from the river itself are also a source of impurity to the atmosphere about the Houses of Parliament.

I believe these exhalations may be considerably reduced, if not wholly removed, and the water of the river rendered more pure than it is at present, by simple means within our power.

I shall be happy, if you desire it, to submit the detail of these means for your consideration. In such case, I shall have to repeat my analysis, and obtain some further data, to enable me to make with accuracy the necessary drawings.

I have, &c.
(signed) *Goldsworthy Gurney.*

The Right Honourable the
First Commissioner of Works, &c.

Sir, Office of Works, &c., 29 May 1857.

By direction of the First Commissioner of Her Majesty's Works, &c., I transmit to you herewith copy of a report, dated the 25th instant, which has, at his request, been made to him by Mr. G. Gurney on the state of the sewers in the neighbourhood of the Houses of Parliament, pointing out the existing nuisances, and stating the manner in which he thinks those nuisances may be remedied. And I am to request that you will lay the same before the Metropolitan Board of Works.

I am, &c.
(signed) *Alfred Austin*, Secretary.

E. H. Woolrych, Esq.

Metropolitan Board of Works, No. 1, Greek-street, Soho,
30 May 1857.

Sir,

In reply to your communication of the 29th instant, I am directed to inform you that it will be laid before the Metropolitan Board of Works.

I have, &c.
(signed) *E. Cresy.*

Alfred Austin, Esq., Office of Works, &c.

Sir, House of Commons, June 1857.

At the request of the Speaker, I called your attention on the 25th May last, to the offensive state of the atmosphere about the Houses of Parliament, and suggested that the open mouths of certain sewers in the neighbourhood should be trapped. As the hot weather continues, the pollution increases, and I beg to observe that the mouths of these sewers are still untrapped.

The river is now in such a pestilential state, that it is with the greatest difficulty we can keep the pestilential stench out of the House. I have again examined the sewers with some of the officers from the Commissioners of Sewers; they admit there is no difficulty in their being trapped. May I therefore ask the favour of your using your authority to have them done, the earlier the better, as we may expect the nuisance will still increase as the freshet decreases.

I have, &c.
(signed) *Goldsworthy Gurney.*

The Right Honourable the
First Commissioner of Her Majesty's
Works, &c.

Metropolitan Board of Works,
Engineer's Department, 1, Greek-street, Soho,
Sir, 14 July 1857.

Your letter of the 29th May last, enclosing a copy of a report made to the First Commissioner of Her Majesty's Works, &c., by Mr. Goldsworthy Gurney, on the state of the sewers in the neighbourhood of the Houses of Parliament, has been submitted to this Board; and I am directed to inform you that the Board has ordered the extension of the outlets of the Wood-street, the Horseferry-road, and the Grosvenor Ditch main sewers to low water in the River Thames.

I am, &c.
(signed) *J. W. Bazalgette*, Engineer.

Alfred Austin, Esq.,
Her Majesty's Board of Works.

Sir, Houses of Parliament, 14 July 1857.

In answer to your question respecting the sewers on the river, I have made all necessary inquiries and observations.

First, in regard to the periods at which the flushing drains are opened.—In dry weather the mouths require to be opened to the river for filling the flushing beds almost every tide, but in wet weather there is generally sufficient rain water for the purpose.

With regard to the period of tide at which they are opened.—They may be opened at any time from half flow to high water. At neap tides they are opened at or near high water.

With respect to the effect produced from opening the mouths of the sewers.—Nothing can be more offensive; a sudden outbreak of stinking gaseous sewage takes place; as the water runs in, the effluvia runs out, displacing volume for volume. It also escapes rapidly, from the fact of being lighter than the atmosphere. On a gradual fall of the barometer, generally before rain, the escape of effluvia is increased. On a sudden fall of the barometer, as before a storm, I have known the whole surface of the river become pestilential in less than 20 minutes.

With respect to the distance at which the discharge from the open mouths of the sewers is felt, much depends on the state of the weather and direction of wind. In a calm it hangs about the river to within a short distance of its escapage; but in windy weather it is driven by the wind, and felt at a considerable distance.

The run of the tide in calm weather generally produces a local current of air along the surface of the river, moving at the same rate and in the same direction as the water. The stench in such case falls into this aërial current, and is carried by it up and down the river as the tide sets. Sometimes volumes of

accumulated

accumulated stench, escaping into this current from the different mouths of the sewers down the river, is brought up by this tidal current of air, and renders the atmosphere about the House pestilential for hours together.

When the wind is blowing across the river, the main escapage will be driven in that direction; but along shore, on the leeward side, there is generally a retrograde or brattice current of air, which retains and carries a portion of the stench with it. In hot weather, when evaporation from the river is considerable, the effluvia will rapidly combine with the water held in solution in the air, and remain for a longer time than otherwise on its surface.

With respect to the question as to whether trapping would have any counteracting effect, I would answer most certainly, Yes. If the mouths of the sewers on both sides of the river from Rotherhithe to Vauxhall were properly trapped, we should have a very different state of atmosphere at the Houses of Parliament, and also on every part of the river. Trapping the open mouths of the sewers in the neighbourhood of the Houses will reduce considerably the present nuisance; but to do away with it effectually, the mouths of all the sewers should be trapped up and down the river. This would be a great comfort to the public, and protection to health.

The traps must be properly made air-tight, sound in principle, and perfect in construction.

It is said that the mouth of the intake flushing sewer at Lambeth Stairs cannot be trapped; this is a mistake.

With respect to the question of danger or inconvenience likely to arise from trapping back the effluvia of the sewers, I would observe that no inconvenience need arise from it, for this question has long since been set at rest by arrangements made at this House by Her Majesty's Commissioners of the Board of Works.

I have, &c.
(signed) *Goldsworthy Gurney.*

The Right Honourable the
First Commissioner of Her Majesty's
Works, &c.

Sir, Office of Works, &c., 17 July 1857.

I am directed by the First Commissioner of Her Majesty's Works, &c. to send you herewith the copy of a letter, dated the 14th instant, which he has received from Mr. Bazalgette, the engineer to the Metropolitan Board of Works, in reply to one from this Board, dated the 29th May last, enclosing copy of your report of the 25th of that month, respecting the state of the sewers in the neighbourhood of the New Palace at Westminster.

I am, &c.
G. Gurney, Esq. (signed) *Alfred Austin*, Secretary.

Lord Great Chamberlain's Office, House of Lords,
Sir, 16 July 1857.

Will you permit me to draw your attention to the pestilential state of the atmosphere at times in and about the New Houses of Parliament, owing to the evaporation of the sewage matter in the Thames on hot sunny days. The stench arising from the river has on several occasions compelled me to leave the terrace, and I am frequently obliged to close all the windows of my office to exclude, if possible, the noisome air, the subtle poison of which, however, penetrates everywhere, causing headache, nausea, and loss of appetite. This state of things must be most injurious to the health of the Members of both Houses of Parliament, as well as of those who have official residences within the building. I fully expect, from my own experience, that both the Speaker and Black Rod will find it impossible to occupy their new residences abutting on the river without serious derangement of health. The nuisance is becoming greater annually.

Surely humanity requires that the Government should take up in earnest this question of the purification of the Thames, for the sake of the thousands of lives which are daily and hourly imperilled from the chance of cholera, fever, or some other fatal pestilence breaking out in consequence of the atmosphere being surcharged with such an amount of pestiferous matter.

I have, &c.
(signed) *Robert Burrell*, Secretary.

The Right Honourable
Sir Benjamin Hall, Bart., M.P.,
&c. &c. &c.

Sir,
Houses of Parliament, 18 July 1857.

I BEG to acknowledge the receipt of your letter of yesterday, enclosing the copy of a letter from the Metropolitan Board of Works to the First Commissioner, respecting the sewers in the neighbourhood of the New Palace at Westminster.

I am sorry to observe that no mention whatever is made in this letter of the Lambeth pier sewer; the trapping of this sewer I consider most important; I especially called attention to it in my report to the First Commissioner on the 25th May last.

I have, &c.
(signed) *Goldsworthy Gurney.*

Alfred Austin, Esq.

Sir,
Office of Works, &c., 20 July 1857.

THE First Commissioner of Her Majesty's Works, &c., having transmitted to Mr. Goldsworthy Gurney a copy of your letter of the 14th instant, stating, with reference to Mr. Gurney's report to this Board on the state of the sewers in the neighbourhood of the Houses of Parliament, that the Metropolitan Board of Works had ordered the extension of the outlets of the Wood-street, the Horseferry-road, and the Grosvenor ditch main sewers to low water in the River Thames; I am directed to send you herewith copy of a letter dated the 18th instant, which the First Commissioner has received from Mr. Gurney, expressing his regret that no mention is made by you of the Lambeth pier sewer, the trapping of which he considers most important.

I also enclose copy of a further report, dated the 14th instant, received from Mr. Gurney, respecting the sewers having outlets to the River Thames. And I am to request that you will be so good as to lay both these papers before the Metropolitan Board of Works.

I am, &c.
(signed) *Alfred Austin*,
Secretary.

J. W. Bazalgette, Esq.

Sir,
5, Whitehall-place, 20 July 1857.

I HAVE to acknowledge the receipt of Mr. Austin's Minute, dated the 18th instant, endorsed on an extract from a letter of Mr. Goldsworthy Gurney, dated the 25th May 1857, viz., "The solicitor, as to the course to be adopted to abate these nuisances." I have perused the extract which says, "There are nuisances affecting the atmosphere of the Houses of Parliament on the other side of the river from offensive manufactories; the effluvia from the other side constantly finds its way to this, and is very offensive." Without further and fuller information, stating the precise nature and locality of the nuisances complained of, with the names and residences of the persons committing them, and the effect of those nuisances upon the occupiers of the Houses of Parliament and the neighbourhood, I can only state generally that the usual and most constitutional remedy for a public nuisance is by indictment; but I would also beg to refer to the 1st Section of the Act 16 & 17 Vict. cap. 128, which enacts, that if any person, after the 1st August 1854, shall within the Metropolis carry on any trade or business which shall occasion any noxious or offensive effluvia, or otherwise annoy the neighbourhood or inhabitants, without using the best practicable means for preventing or counteracting such smoke or other annoyance, every person so offending, being the owner or occupier of the premises, or being a foreman or other person employed by such owner or occupier, shall upon a summary conviction for such offence before any justice or justices, forfeit and pay a sum not more than 5 *l.* nor less than 40 *s.*; and upon a second conviction, the sum of 10 *l.*, and for each subsequent conviction double the amount of the penalty imposed for the last preceding conviction, provided that the enactment shall not extend to any glass works or pottery works.

Under this Act no information is to be laid except by the authority of the Secretary of State, or in the Metropolitan Police District by the Commissioners of Police of the Metropolis. I would also beg to refer to the 27th Section of "The Nuisances Removal Act for England, 1855," 18 & 19 Vict. cap. 121, which provides that if any manufactory, used for any trade, business, process or manufacture causing effluvia, be certified to the local authority by any medical officer, or any two legally qualified medical practitioners, to be a nuisance, or injurious to the health of the inhabitants of the neighbourhood, the local authority shall direct complaint to be made before any justice, who may summon before any two justices in petty session assembled, at their usual place of meeting, the person by or in whose behalf the work so complained of is carried on, and such justices shall inquire into the complaint, and if it shall appear to them that the business is a nuisance, or causes any effluvia injurious to the health of the inhabitants of the neighbourhood, and that such person shall not have used the best practicable means for abating such nuisance, or preventing or counteracting such effluvia, the person so offending (being the owner or occupier of the premises, or being a foreman or other person employed by such owner or occupier) shall, upon summary conviction for such offence, forfeit and pay not more than 5 *l.*, nor less than 40 *s.*, and upon a second conviction 10 *l.*, and for each subsequent conviction double the amount for the last preceding conviction, but the highest amount not to exceed in any case 200 *l.*, with a proviso that the justices may suspend their final determination on the person complained against undertaking to adopt means for abating the nuisance, or mitigating or preventing the injurious effects of such effluvia, or entering into recognizances to appeal and appealing accordingly, and with this further proviso, "that the provisions hereinbefore contained shall not extend or be applicable to any place without the limits of any city, town, or populous district;" and the 28th Section gives to the party complained against the option of a reference to the superior courts at law or equity, upon his entering into recognizances with sufficient sureties to abide the event of such proceedings in the superior courts, as may be had against him on account of the subject-matter of complaint. I would also beg to refer to the 134th Section of the 18 & 19 Vict. cap. 120, which directs every vestry and district Board under that Act, within their respective parish or district, to execute all the duties and powers exercisable under the Nuisances Removal and Diseases Prevention Act, 1848, and the Nuisances Removal and Diseases Prevention Act, 1849, by any commissioners or other body, or any officers having under any Act powers of cleansing, and constitutes them "the local authority to execute any Act passed or to be passed in the present Session, amending or repealing the said Acts, or either of them." For the abatement, therefore, of public nuisances in the metropolis, proceedings, according to the circumstances of the case, may be had either by indictment at common law, or by proceedings under the Smoke Act, 16 & 17 Vict. cap. 128, or by proceedings under "The Nuisances Removal Act for England, 1855," 18 & 19 Vict. cap. 121. But until the further information and particulars above adverted to have been procured, no opinion, I humbly apprehend, can be formed, as to which of the courses above pointed out should be adopted for the abatement of the nuisances so generally adverted to in the extract from Mr. Gurney's Letter, which, together with the Minute endorsed thereon, I herewith return.

I have, &c.
(signed) *John Gardiner.*

The Right Hon. the First Commissioner,
&c. &c. &c.

Sir, Office of Works, &c., 21 July 1857.

THE First Commissioner of Her Majesty's Works, &c., has had before him your letter of yesterday's date, reporting on Mr. Goldsworthy Gurney's representation of the nuisances affecting the atmosphere of the Houses of Parliament, from offensive manufactories on the other side of the river. And I am directed to request that you will put yourself in communication with Mr. Gurney, with the view of taking the necessary steps for abating the nuisances in question.

I am, &c.
(signed) *Alfred Austin*,
Secretary.

J. Gardiner, Esq.

Sir, Office of Works, &c., 21 July 1857.

WITH reference to my letter to you of yesterday's date, enclosing copies of two reports, received by the First Commissioner from Mr. G. Gurney, respecting the outlets of the sewers in the Thames as affecting the New Palace at Westminster, I am directed by the First Commissioner to send you herewith copy of a letter, dated the 16th instant, which he has received from Mr. Burrell, secretary to the Lord Great Chamberlain, on the same subject, and to request that you will lay the same before the Metropolitan Board of Works.

I am, &c.
(signed) *Alfred Austin*,
Secretary.

J. W. Bazalgette, Esq.

Sir, Houses of Parliament, 23 July 1857.

IN answer to your letter of yesterday, respecting the nuisances from the manufactories affecting the atmosphere of the Houses of Parliament,

I beg to observe, that the most offensive source is from a bone-boiling factory in Princes-street, Lambeth, belonging to Mr. Jared Terrett Hunt.

There are other minor nuisances at the same place, arising from unburnt smoke and other sublimed compounds from clay and other matters used in the potteries.

I may add, that at times there is a greater escapage of offensive effluvia from the gasworks at Vauxhall Bridge than there need be.

I am, &c.
(signed) *Goldsworthy Gurney*.

John Gardiner, Esq.
Office of Works, &c.

Sir, 5, Whitehall-place, 24 July 1857.

I HAVE to acknowledge the receipt of Mr. Austin's letter, dated the 21st instant, in reply to mine of the preceding day's date, reporting on Mr. Gurney's representation of the nuisances affecting the atmosphere of the Houses of Parliament from offensive manufactories on the other side of the river, and signifying to me your directions that I would put myself in communication with Mr. Gurney, with the view of taking the necessary steps for abating the nuisances in question; and I have to state that I have written to Mr. Gurney for the further information suggested in my report, and I have this day received a letter from him which I herewith transmit, in which he states that the most offensive source is from a bone-boiling factory in Princes-street, Lambeth, belonging to Mr. Jared Terrett Hunt; that there are other minor nuisances at the same place, arising from unburnt smoke, and other sublimed compounds from clay and other matters used in the potteries; and he adds that at times there is a greater escapage of offensive effluvia from the gasworks at Vauxhall Bridge than there need be; and I have to report that I find upon inquiry the proper course of dealing with this complaint will be for you to refer it to the Secretary of State for the Home Department, who will thereupon direct the Commissioners of Police to cause their constables or other officers to investigate and inquire into the matter on the spot, and to procure the evidence necessary to form the basis of any legal proceedings for the suppression or abatement of the nuisances; that the Commissioners of Police will thereupon report to the Secretary of State the result of their inquiries, with the evidence procured by them, which will in the ordinary course be forwarded to the Lords of the Treasury, who will refer it to their solicitors, in whose department proceedings for the removal of nuisances of the nature complained of are conducted.

I have, &c.
(signed) *John Gardiner.*

The Right Honourable
the First Commissioner,
&c. &c. &c.

Sir, Office of Works, &c., 25 July 1857.

By direction of the First Commissioner of Her Majesty's Works, &c., I send you herewith an extract from a report, dated the 25th May last, from Mr. G. Gurney, who has the charge, under this Board, of the warming, lighting, and ventilating of the Houses of Parliament, respecting the nuisances affecting the atmosphere of those Houses from offensive manufactories on the other side of the river. I also enclose copy of a letter, dated the 23d instant, from Mr. Gurney, to the solicitor for this department, specifying some of the manufactories referred to by him. And I am to request that you will submit these papers to Secretary Sir George Grey, and move him to cause such steps to be taken for the abatement of the nuisances in question as he shall deem most advisable.

I am, &c.
(signed) *George Russell,*
Assistant Secretary.

H. Waddington, Esq.

Metropolitan Board of Works,
Engineer's Department, 1, Greek-street, Soho,
28 July 1857.

Sir,

I beg to acknowledge the receipt of your letter of the 20th instant, enclosing copies of further reports made to the First Commissioner of Her Majesty's Works, &c., by Mr. Goldsworthy Gurney, with respect to the trapping of the outlets of the sewers along the River Thames. These, together with your communication of the 21st instant, enclosing a copy of a letter from the Lord Great Chamberlain's secretary upon the same subject, have been duly submitted to this Board; and I am directed to inform you that the inlet which Mr. Gurney calls the "Lambeth Pier Sewer," but which is known to this Board as the Archbishop's Inlet, is not a sewer discharging into the river, but is merely a closed communication between a sewer and the river, which can be opened at will to admit the river water into the sewer for the purpose of cleansing it. This inlet is most completely trapped, and when properly worked no nuisance can arise therefrom.

With regard to Mr. Gurney's suggestion that the mouths of the sewers on both sides of the river from Vauxhall to Rotherhithe should be trapped, and in reply to the communication from the secretary to the Lord Great Chamberlain upon the foul condition of the River Thames, I am directed to state that these subjects are connected with and depend upon the main intercepting scheme which has been submitted to the First Commissioner of Her Majesty's Works, &c., and still awaits his approval.

I am, &c.
(signed) *J. W. Bazalgette,*
Engineer.

Alfred Austin, Esq.

Sir, Office of Works, &c., 30 July 1857.

By direction of the First Commissioner of Her Majesty's Works, &c., I send you herewith an extract from a report from Mr. Goldsworthy Gurney, who has the charge under this Board of the warming, lighting, and ventilating of the Houses of Parliament, respecting the nuisances affecting the atmosphere of those Houses from offensive manufactories on the other side of the river.

I also enclose copy of a letter, dated the 23d instant, from Mr. Gurney to the solicitor for this department, specifying some of the manufactories referred to by him. And I am to request that you will submit these papers to the vestry of the parish of Lambeth, and move them to cause steps to be taken for the suppression or abatement of the nuisances in question.

I am, &c.
(signed) *Alfred Austin*, Secretary.

Thomas Roffey, Esq.
Vestry Hall, Lambeth.

Sir, Whitehall, 29 July 1857.

I HAVE laid before Secretary Sir George Grey your letter of the 25th instant, and its enclosures, respecting certain offensive manufactories on the Surrey side of the Thames, which affect the atmosphere of the Houses of Parliament; and I am to acquaint you for the information of the First Commissioner of Works, &c., that since the passing of the Metropolis Local Management Act, the prosecution of nuisances is left to the local authorities of parishes, which are provided with ample powers for that purpose. Sir George Grey would suggest that in the instances referred to in your letter, application should be made to the local authority of the parish in which the offensive manufactories are situate.

I am, &c.
(signed) *H. Waddington.*

George Russell, Esq.

Sir, Houses of Parliament, 30 July 1857.

I BEG to acknowledge the receipt of a letter to you from the engineer of the Commissioners of Sewers of the 28th instant, respecting the trapping of the sewers along the sides of the river.

In answer to that letter, I beg to say I have been well aware that the mouth of the Lambeth Pier Sewer is used for the admission of water for flushing; and stated as much in my letter to the Chief Commissioner of the 14th instant, last paragraph but one, and pointed out how the stench was driven out. The mouth of this sewer is closed by a penstock, on lifting which a quantity of effluvia escapes. I have just had it examined, and find that the mouth of this inlet is still untrapped.

I beg further to oserve, that the mouth of the Bridge-street Sewer has lately also been untrapped, the stench from the mouth of which, about three years since, was a great annoyance, and was then trapped at my representation, when the annoyance ceased.

I am informed that the great Victoria Sewer, going up Parliament-street, has lately broken in somewhere about Whitehall-yard, and that all the sewage which used to go through this large sewer was forced down the Bridge-street Sewer; that lately, in order to empty Grosvenor Basin, they passed the whole of the water and mud down this small sewer; the result was, the "blowing up," as it is called, of the trapping at the mouth of the sewer; this fact has considerably augmented the pestilential state of the atmosphere of the river, and the whole of the neighbourhood.

I beg to enclose the letter given to me, 3,480/57.

I have, &c.
(signed) *Goldsworthy Gurney.*

A. Austin, Esq.

(signed) *B. Hall*,
First Commissioner of Her Majesty's
Works and Public Buildings.

Office of Works, &c.
8 August 1857.

RIVER THAMES.

COPIES of Correspondence between the First Commissioner of Works and Mr. *Goldsworthy Gurney*, and the Commissioners of Sewers and the Board of Works, on the State of the River Thames, and the Pollution of the Atmosphere on the Banks of the Thames and the Houses of Parliament.

(*Mr. Estcourt.*)

Ordered, by The House of Commons, *to be Printed,*
11 *August* 1857.

257—Sess. 2.

Under 2 *oz.*

VESTRY CLERKS (METROPOLITAN PARISHES).

ABSTRACT

OF

RETURN to an Address of the Honourable The House of Commons,
dated 14 May 1857;—*for*,

A "RETURN of the Annual Amount of SALARY paid to each VESTRY CLERK of every METROPOLITAN PARISH under the METROPOLIS LOCAL MANAGEMENT ACT."

NAME OF PARISH.	SALARY PER ANNUM.			OBSERVATIONS.
	£.	*s.*	*d.*	
Aldgate, St. Botolph - - -	105	–	–	
Artillery Ground (Old). *See* Spitalfields, Christchurch.				
Battersea, St. Mary (Surrey) - -	100	–	–	
Bethnal-green, St. Matthew - -	250	–	–	
Bishopsgate. *See* Norton Folgate, Liberty of.				
Bloomsbury, St. Giles-in-the-Fields and St. George.	600	–	–	Joint and separate parishes.
Bromley, St. Leonard (Middlesex) -	300	–	–	
Camberwell, St. Giles - - -	500	–	–	- - Paying clerks thereout and transacting churchwarden's and overseer's business, and acting as clerk to the charity estates.
Chelsea, St. Luke - - - -	250	–	–	
Clapham (Surrey) - - - -	130	5	–	
Clement, St., Danes - - -	120	–	–	
Clerkenwell, St. James - - -	180	–	–	- - To be increased 10*l.* per annum for two years.
Deptford, St. Nicholas - - -	no salary		-	- - Office of vestry clerk abolished; "legal adviser of the parish," paid by professional services. Parish in Schedule (B.) of the Act.
———, St. Paul - - -	200	–	–	- - Parish in Schedule (B.) Preparation of rates for lighting, &c. paid by vestry out of monies collected under a local Act, and not by salary.
Eltham (Kent) - - - -	10	–	–	
Fulham (Middlesex) - - -	110	–	–	- - As assistant overseer, performing the duties of vestry clerk.
George, St., in-the-East - - -	400	–	–	- - Subject to deduction of 100*l.* per annum for assistant clerk. All legal business connected with the vestry is performed without charge, except for disbursements, and excepting also prosecutions, actions at law, suits in equity, and Parliamentary business.

(*continued*)

Name of Parish.	Salary per Annum.			Observations.
	£.	s.	d.	
Glasshouse Yard, Liberty of	6	6	–	
Hampstead, St. John	250	–	–	
Hackney, St. John	no salary.			
Hammersmith	no salary			- - No salary as vestry clerk; 170 *l.* as assistant overseer; viz., 120 *l.* for duties connected with the Poor-laws, and 50 *l.* for those under the Metropolitan Local Management Act.
Hanover Square, St. George	450	–	–	
Holborn, St. Andrew	no salary.			
———, St. George the Martyr *See* also Glasshouse Yard, Liberty of; Saffron Hill, Hatton Garden, and Ely Rents, Liberty of.	no salary			- - £.10. 10. for the first year, which has expired, and no salary has since been fixed.
Islington, St. Mary	500	–	–	- - No charge for professional business, except money out of pocket.
Katherine, St. (Middlesex), Precinct of	25	–	–	
Kensington, St. Mary Abbott's:				
Vestry Clerk	200	–	–	
Clerk to the Vestry	200	–	–	
Lambeth, St. Mary	400	–	–	No charge for professional business.
Lee, Kent	50	–	–	
Limehouse, St. Anne's	60	–	–	- - Salary of vestry clerk increased 60 *l.*, in consequence of additional duties under the Metropolitan Local Management Act.
Luke, St., Old-street	500	–	–	- - Including clerks' salaries and professional business.
Martin, St., in-the-Fields	200	–	–	- - Subject to deduction for clerk's salary.
Marylebone, St.	400	–	–	
Mary-le-Strand, St.	52	10	–	
Mary, Stratford-le-Bow, St. (Middlesex).	70	–	–	
Mile-End, New Town	140	–	–	
Mile-End Old Town:				
Clerk to Vestry	200	–	–	- - Including professional charges, except costs out of pocket.
Vestry Clerk	300	–	–	- - Including clerks' salary, copying rate-books, &c.
Newington, St. Mary (Surrey)	500	–	–	- - Including clerks, and the performance of all Parliamentary and law business, except costs out of pocket.
Norton Folgate, Liberty of	no salary			- - £.5. 1. 4. for six months; salary not yet fixed.
Old Artillery Ground. *See* Spitalfields, Christchurch.				
Paddington	450	–	–	

NAME OF PARISH.	SALARY PER ANNUM. £. s. d.	OBSERVATIONS.
Pancras, St., Middlesex - - -	500 - -	- - With allowance for all monies properly disbursed in matters of business.
Paul, St., Covent Garden - -	150 - -	
Penge, Hamlet of (Surrey) - -	no salary -	- - Paid according to the amount of business transacted.
Poplar, All Saints - - - -	no salary.	
Putney (Surrey) - - - - -	52 10 -	Parish in Schedule (B.)
Rolls, Liberty of - - - - -	50 - -	Exclusive of legal business.
Rotherhithe, St. Mary (Surrey) -	300 - -	With deductions for clerks and offices.
Saffron Hill, Hatton Garden, and Ely Rents, Liberty of.	no salary.	
Savoy, Precinct of - - - -	25 - -	
Sepulchre, St., Middlesex - -	no salary.	
Shoreditch, St. Leonard - - -	250 - -	
Assistant Clerk - - -	100 - -	
Southwark, St. George-the-Martyr -	315 - -	Deducting salaries of clerks.
————, St. John - - -	243 15 -	- - £. 183. 15. under Local Acts; 60 *l.* under Metropolitan Local Management Act.
————, St. Olave - - -	150 - -	
————, St. Saviour's - - -	125 - -	Parish in Schedule (B.)
————, St. Thomas's - -	10 - -	
Spitalfields, Christchurch - -	150 - -	- - No increase under Metropolitan Local Management Act.
————, Old Artillery Ground -	40 - -	- - £. 25; and 15 *l.* under Metropolitan Local Management Act.
Stoke Newington, St. Mary - -	80 - -	- - Defrayed out of a voluntary rate for parochial charges, distinct from church charges.
Stratford-le-Bow, St. Mary, Middlesex. *See* Mary, Stratford-le-Bow, St.		
Streatham (Surrey) - - -	60 - -	
Tooting Graveney, - - - -	30 - -	
Wapping, St. John - - -	50 - -	
Westminster, St. Ann - - -	100 - -	
————, St. James - - -	400 - -	- - Including professional services, except costs out of pocket.
————, St. Margaret and St. John	250 - -	
Whitechapel, St. Mary - - -	120 - -	
Woolwich (Kent) - - - -	20 - -	

VESTRY CLERKS (METROPOLITAN PARISHES).

ABSTRACT

OF

RETURN of the Annual Amount of SALARY paid to each VESTRY CLERK of every METROPOLITAN PARISH under the METROPOLIS LOCAL MANAGEMENT ACT.

(*Mr. Thomas Duncombe.*)

Ordered, by The House of Commons, *to be Printed,*
28 *August* 1857.

345—Sess. 2.

Under 1 *oz.*

WESTMINSTER NEW PALACE.

RETURN to an Address of the Honourable The House of Commons,
dated 9 June 1857;—*for*,

"COPIES of all further CORRESPONDENCE between the Treasury and Sir *Charles Barry*, and between the First Commissioner of the Board of Works and Sir *Charles Barry*, respecting his REMUNERATION as ARCHITECT of the NEW PALACE at WESTMINSTER, up to the present Time (in continuation of Parliamentary Paper, No. 405, of Session 1856)"

1.—TREASURY.

THERE has been no further correspondence between the Treasury and Sir Charles Barry "respecting his remuneration as Architect of the New Palace at Westminster," since that given in Parliamentary Paper, No. 405, Session 1856.

Treasury Chambers,
16 June 1857.

James Wilson.

2.—OFFICE OF WORKS.

From Sir *Charles Barry* to Mr. *Austin*.

Sir, Old Palace Yard, 15 July 1856.

WITH reference to your letter of the 12th instant, I enclose, for the information of the First Commissioner of Her Majesty's Works, &c., copy of a letter which I have this day forwarded to the Lords Commissioners of Her Majesty's Treasury, by which he will perceive that, for the reasons therein assigned, I have yielded to the terms presented by their Lordships for my remuneration as the architect of the New Palace at Westminster. I will therefore attend at the Office of Works to-morrow, according to the appointment contained in your letter, for the purpose of entering into the arrangements set forth in their Lordships' Minute of the 4th instant.

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

Sir, Old Palace Yard, 15 July 1856.

I HAVE the honour to acknowledge the receipt of your letter of the 10th instant, transmitting to me, with reference to my letter to Mr. Wilson of the 23d ultimo, copy of a further Minute of the Lords Commissioners of Her Majesty's Treasury, dated the 4th instant, relative to my remuneration as the architect of the New Palace at Westminster.

It is with the deepest regret and disappointment that I find their Lordships have put aside my proposal to refer all matters in dispute between us to arbitration. Their Lordships must be perfectly aware that no individual in my position could with the least chance of success contend with the Government, and therefore that the power of decision virtually rests with themselves. But this very circumstance I had hoped would ensure their determination to refer the case to some authority, the impartiality of whose decision could not be impugned.

However, as their Lordships have thought fit to determine otherwise, and as it is evident, from the tenor of their Minute of the 4th instant, that no further arguments in support of my claim could alter their determination, I have no course left but to yield to necessity, and accept the terms dictated to me; in effect, to submit to a sacrifice of what I fully believe to be fair, legitimate claims, amounting, exclusive of a large sum for interest on payments delayed, to 20,000 *l.* at the least.

But while thus compelled to yield to the decision of their Lordships, I feel it due to myself and to my profession to state that I do not admit the fairness of the arguments, or the accuracy of the statements, upon which it is manifest this decision has been founded; and further, that, after a reconsideration of the whole case, and especially of all the reasons which have been urged on the part of the Government, I remain firmly convinced that the arrangement forced upon me in 1839 has been entirely set aside by the non-fulfilment of any one of its conditions; and my claim ought in justice, to say nothing of liberality, to have been allowed in full.

With respect to the completion of the works in hand, I beg to add, that as every other architect employed on public building has been, and is still being paid his full commission, nothing would induce me to continue my services upon the reduced rate of commission proposed but the strong and natural desire I have to complete a work which, by the devotion of so many years of labour and anxiety, I have endeavoured to render not unworthy of the country.

I am, &c.

Sir C. E. Trevelyan, Bart. (signed) *Charles Barry.*

From Sir *B. Hall* to the Treasury.

My Lords, Office of Works, 17 July 1856.

I BEG leave to acknowledge the receipt of Sir C. Trevelyan's letter, of the 10th instant, transmitting, with reference to my Report of the 11th April last, copy of your Lordships' Minute of the 4th instant, further on the subject of the remuneration to be allowed to Sir C. Barry for his services as architect of the New Palace at Westminster.

With a view to carry out the instructions contained in that Minute, I requested Sir C. Barry to call upon me at this office, which he did yesterday.

I then referred to the Minute, and to the letter which he had written to Sir C. Trevelyan on the 15th instant, and of which he had sent me a copy, and I informed him that the arrangement contained in the Minute must be strictly acted up to, to which he assented.

I also made the following arrangement with him for the purpose of keeping a better check on the expenditure, and avoiding disputes in future; viz.

That the accounts of Mr. Jay, the contractor, and of all other tradesmen employed upon the New Palace, shall be rendered to this office on the 1st of every alternate month, and that at the same time his own account for professional services, and those of the several clerks of the works, shall also be delivered.

The account of the gross expenditure upon works at the New Palace, certified by Sir C. Barry, is made up to the 2d October 1854, and, as stated in your Lordships' Minute above referred to, amounts to 1,508,174 *l.*

Since that time a further expenditure has been incurred of 205,453*l.* 15*s.* 5*d.*

I beg leave to submit to your Lordships that a sum of 10,000 *l.* be advanced to Sir C. Barry on account of his professional services, such advance to be made upon the data set forth in your Lordships' Minute of the 4th instant.

This sum of 10,000 *l.* to be advanced independently of 4,925 *l.* for services in relation to warming, ventilating, &c. the New Palace of Westminster, Sir C. Barry having fully assented to the whole principle of remuneration as set forth in your Lordships' Minute of the 4th instant.

I am, &c.

The Right Hon. the Lords Commissioners of
Her Majesty's Treasury. (signed) *B. Hall.*

THE ARCHITECT OF THE NEW PALACE AT WESTMINSTER.

From Mr. *Wilson* to Sir *B. Hall.*

Sir, Treasury Chambers, 22 July 1856.

The Lords Commissioners of Her Majesty's Treasury have had before them your Report of the 17th instant, stating that Sir C. Barry had assented to the whole principle of remuneration, as set forth in the Minute of this Board of the 4th instant, for his professional services as architect of the New Palace at Westminster; and their Lordships have directed me to acquaint you that they are pleased to approve of the arrangements which you state in your Report you have made, for the purpose of keeping a better check on the expenditure on these works, and to authorise the advance of the sum of 10,000 *l.* to Sir C. Barry, on account of his remuneration, on the principle set forth in the Minute before mentioned, as proposed in your Report.

I am, &c.

The First Commissioner of Works. (signed) *James Wilson.*

From Sir *B. Hall* to the Treasury.

My Lords, Office of Works, &c., 28 July 1856.

I beg leave to acknowledge the receipt of Mr. Wilson's letter of the 22d instant, by which I am informed that your Lordships are pleased to authorise the advance to Sir C. Barry of the sum of 10,000 *l.*, on account of his remuneration for his professional services as architect of the New Palace at Westminster, on the principle set forth in your Lordships' Minute of the 4th instant.

As, however, no mention is made in that letter of the funds out of which such advance is to be made, and as the monies in hand applicable to the New Palace, amounting to 3,857 *l.*, and the small balance of 150 *l.* of the Vote of 1855-6, as well as the Vote of the present Session, amounting to 95,383 *l.*, are devoted to specific purposes, and cannot therefore be made available for this advance, I am under the necessity of bringing the subject again under your Lordships' consideration, and requesting instructions thereon.

I am, &c.

(signed) *B. Hall.*

The Right Hon. the Lords Commissioners of
Her Majesty's Treasury.

From Sir *B. Hall* to the *Treasury.*

My Lords, Office of Works, &c., 9 August 1856.

Adverting to your Lordships' Minute of the 4th ult. respecting the amount of remuneration to be allowed to Sir C. Barry for his services as architect of the New Palace at Westminster, I have to inform your Lordships that he has made pressing application to me for the payment of the sum of 4,925 *l.*, which sum your Lordships are, according to that Minute, prepared to direct to be issued in full satisfaction of his claim for services connected with the warming, lighting, and ventilating arrangements, and upon certain other conditions mentioned in the same Minute.

In my letter to your Lordships of the 17th instant, I informed your Lordships that Sir C. Barry had assented to the terms contained in the Minute, and in my further letter of the 28th ult. I informed your Lordships that the monies in hand, as well as the monies to be received under the Vote of the Session just closed, on account of the New Palace at Westminster, were devoted to specific purposes, and could not be made available for advances to Sir C. Barry.

As there does not appear to be any reason for delay taking place in the payment of the above mentioned sum of 4,925 *l.* to Sir C. Barry, I beg to request your Lordships' instructions upon the subject.

I am, &c.

The Right Hon. the Lords Commissioners (signed) *B. Hall.*
of Her Majesty's Treasury.

From Mr. *Russell* to Sir *C. Barry.*

Sir, Office of Works, &c., 13 August 1856.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to request that you will send in your account to this Board, up to the 30th June last, for works done and services performed in the erection of the New Houses of Parliament, exclusive of the cost of superintendence, and expenses connected therewith.

Such account should be made out in detail, in conformity with the Treasury Minute, which directs the mode of remuneration for all works executed subsequently to the 2d October 1854, and upon which you are entitled to charge.

I am, &c.
(signed) *George Russell,*
Assistant Secretary.

Sir C. Barry, R. A.

From Sir *C. Trevelyan* to Sir *B. Hall.*

Sir, Treasury Chambers, 19 August 1856.

I AM commanded by the Lords Commissioners of Her Majesty's Treasury to acquaint you that directions have been given to the Paymaster-general to issue to you the sum of 4,925 *l.* in full satisfaction of Sir C. Barry's claims for services connected with the warming, lighting, and ventilating arrangements at the New Palace at Westminster, as requested in your letter of the 9th instant.

Their Lordships desire me at the same time to request that you will cause provision to be made in the Estimates for next year for the repayment of this sum to Civil Contingencies.

I am, &c.
(signed) *C. E. Trevelyan.*

The First Commissioner of Works, &c.

From *Sir Charles Barry* to Mr. *Russell.*

Sir, Old Palace Yard, 21 August 1856.

IN compliance with the request contained in your letter of the 13th instant, I forward to you my account for services performed in the erection of the New Houses of Parliament from the 2d October 1854 to the 30th June last, made out in conformity with the Treasury Minute of the 4th July last.

I am, &c.
(signed) *Charles Barry.*

George Russell, Esq.

From Mr. *Russell* to Sir *Charles Barry.*

Sir, Office of Works, &c., 22 August 1856.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acquaint you that he has caused a statement to be prepared of all sums certified by you for payment for work done, articles supplied, and services performed in the erection of the New Houses of Parliament, and for fittings, finishings and furniture to the same (exclusive of the cost of the river wall and embankment), and of all charges for superintendence and expenses connected therewith from the commencement to the 2d October 1854.

I am to state that the total amount of accounts which have been certified by you appears in such statement to be 1,506,189*l.* 16*s.* 5*d.*, from which is to be deducted a sum of 2,396*l.* 14*s.* 4*d.*, the cost of removing the coffer-dam required in the construction of the river wall and embankment, leaving an amount of 1,503,793*l.* 2*s.* 1*d.*, subject to the operation of the Treasury Minutes of the 29th January and 4th July last; that the 4 per cent. commission on such sum amounts to 60,151*l.* 14*s.* 5*d.*, on account of which you have received payments amounting to 54,735*l.* 3*s.* 9*d.*, as follows, viz.

	£.	s.	d.
Under the original Treasury Regulations of 28 February 1838	24,735	3	9
10 September 1850	5,000	–	–
January 1852	5,000	–	–
21 July 1853	5,000	–	–
2 October 1854	5,000	–	–
30 July 1856	10,000	–	–
£.	54,735	3	9

leaving a sum of 5,416*l.* 10*s.* 8*d.* due thereon, to which is to be added the commission at 2½ per cent. on the cost of removing the coffer-dam, viz., 59*l.* 19*s.* 4*d.*, making a balance due to you of 5,476*l.* 9*s.*

I am to add, that if you will depute some person to attend at this office, the accounts will be ready for his inspection, in order that the balance may be paid to you with the least possible delay.

I am, &c.
(signed) *George Russell,*
Assistant Secretary.

Sir C. Barry.

From Sir *Charles Barry* to Mr. *Russell.*

Sir, Old Palace Yard, 25 August 1856.

I HAVE to acknowledge the receipt of your letter of the 22d instant, containing a statement with respect to my professional remuneration as the architect of the New Palace at Westminster, up to the 2d October 1854. In compliance with the permission contained therein, my surveyor has attended at your office for the purpose of examining that statement, which, as far as regards the items contained in it, he finds to be so nearly in accordance with his own calculations, that I beg to inform you I am willing to abide by the amount of it and the per-centages upon it as stated in your letter. In addition, however, I have to claim the 4 per cent. allowance upon the two following items, in accordance with the Treasury Minutes of the 29th January and the 22d July last, as part of the outlay for services rendered prior to the 2d October 1854:

	£.
For designs for the plate, linen, crockery, &c., for the Refreshment Rooms of the House of Commons, and the services connected therewith	1,393
For the amount of salary paid to the Superintendent of the Stone Carving Department, which legitimately forms a portion of the cost of the works executed, amounting to	2,934
£.	4,327

Upon which amount the sum due to me, at the rate of 4 per cent., is 173 *l.*

I am, &c.
(signed) *Charles Barry.*

George Russell, Esq.

P. S.—In strict fairness, a portion of Mr. Bayne's salary should be added to the cost of the wood carving, inasmuch as he acts in the double capacity of superintendent of that department, and clerk of the works, to overlook Mr. Jay's men employed upon the carpenters' and joiners' works for the building; but as a difference of opinion might occur as to what proportion of his salary should attach to each of his offices, I am willing, in order to save time, to waive all claim in respect of his salary as superintendent of the wood carving.

(signed) *C. B.*

From Mr. *Austin* to Sir *Charles Barry*.

Sir, Office of Works, &c., 4 Sept. 1856.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 25th ultimo, to the effect that you have caused the statement prepared in this office with respect to your professional remuneration as the architect of the New Palace at Westminster up to the 2d of October 1854, to be examined; and that, as far as regards the items contained in it, you are willing to abide by the amount of it, and the percentages upon it as stated in the First Commissioner's letter of the 22d ultimo; but that you claim the 4 per cent. allowance, amounting to 173 *l.*, upon the two following items in addition, viz.:—

1. For designs for the plate, linen, &c. for the Refreshment Rooms of the House of Commons, and the services connected therewith - - - - - - -	£. 1,393
2. For the amount of salary paid to the Superintendent of the Stone Carving Department - - - - -	2,934
	£. 4,327

And I am directed to inform you that the Board cannot admit the validity of such claim, inasmuch as the articles referred to in the first item were not ordered by this Board, but by the Refreshment Committee of the House of Commons, to the Chairman of which Committee the Bill for the same was returned with the explanation that it was a matter with which the Board had nothing to do; and as regards the second item, because the service referred to is considered to come under the head of "Superintendence," the cost of which is expressly excluded by the Treasury Minutes regulating this matter.

I am, &c.
Sir Charles Barry. (signed) *Alfred Austin*,
Secretary.

From Sir *Charles Barry* to Mr. *Austin*.

Sir, Old Palace Yard, 8 September 1856.

I HAVE to acknowledge the receipt of your letter of the 4th instant, conveying to me the decision of the Board upon the claims which I preferred in my letter to you of the 25th ultimo. As this decision appears to me to be founded upon a misapprehension of the facts of the case, I have most respectfully to request that it may be reconsidered upon the following grounds:

Firstly, with reference to the services I have rendered to the House of Commons' Refreshment Department. As the Government has identified itself with these services, and has acknowledged its liability for the requital of them, by having paid the tradesmen employed for the articles supplied, it would surely be only fair and consistent that the professional services by which alone such articles were manufactured and supplied, and which form a part of the cost of them, should also be paid for in like manner.

And, secondly, with reference to the stone carving claim, I beg to observe, that I alone am the responsible director and superintendent of that department. Mr. Thomas, who holds his appointment under myself, as carver-in-chief, is essentially an executant, and not, as supposed, a superintendent. His office is to prepare full sized working drawings, and set out the work, under my own control and personal direction. The salary paid to him, therefore, like the wages paid to the foremen and workmen in his department, forms part of the cost of the work actually executed, upon which I consider I am fairly entitled to my commission upon the terms of the Treasury Minutes referred to in your letter.

I am, &c.
Alfred Austin, Esq. (signed) *Charles Barry*.

From Mr. *Austin* to Sir *Charles Barry*.

Sir, Office of Works, &c., 3 October 1856.

I AM directed by the First Commissioner of Her Majesty's Works, &c. to acknowledge the receipt of your letter, dated the 8th ult., urging his reconsideration of your claim to be allowed commission upon the sum of 1,393 *l.* expended for plate, linen, and other articles supplied to the Refreshment Rooms of the House of Commons; and upon 2,934 *l.* for salary paid to the superintendent of the stone carving department of the New Palace at Westminster.

In reply, I am desired to acquaint you that the First Commissioner has given his attention to the subject, and that he can see no reason in the arguments which you have advanced in support of your claim, for altering his decision, already communicated to you in my letter of the 4th ult.

I am, &c.
(signed) *Alfred Austin*,
Secretary.

Sir Charles Barry.

From Sir *Charles Barry* to Mr. *Austin*.

Sir, Office of Works, &c., 4 October 1857.

I HAVE to acknowledge the receipt of your letter of the 2d instant, respecting my claims for designs, &c., for the plate, linen, and other articles supplied for the use of the House of Commons, and also in respect of the amount paid for the services of the carver-in-chief, as part of the cost of the stone carvings of the New Palace at Westminster; and, in reply, I have to express my disappointment and regret that the First Commissioner of Her Majesty's Works, &c. is not disposed to admit the validity of the further arguments which I advanced in support of these claims in my letter to you of the 8th ult., or to alter his decision respecting them.

The claims in question are most undoubtedly items of outlay upon the works of the New Palace, upon which my remuneration is directed by the Minute of the Lords Commissioners of Her Majesty's Treasury, of the 4th of July last, to be calculated; and with respect to the services of the stone-carver-in-chief, it ought not to be forgotten that they have been secured in consequence of an arrangement adopted by a former Government at my suggestion, whereby thousands have been saved to the country in the cost of the stone and wood carvings of the New Palace.

For the reasons I have already assigned, in my letter to Sir C. Trevelyan, of the 15th July last, I do not intend to offer any further opposition to the decision of the First Commissioner of Her Majesty Works, &c., in respect to the claims in question; but, in yielding to that decision, I cannot refrain from stating that I consider it to be an aggravation of the injustice of the Treasury Minute under which he is directed to act, and a further rejection of claims upon the Government to which I am justly entitled.

Under these circumstances, I have to request that the balance which is declared in your letter of the 22d August last to be due to me for services rendered up to the 2d of October 1854 may be paid without further delay.

I am, &c.
(signed) *Charles Barry*.

Alfred Austin, Esq.

From Sir *B. Hall* to the Treasury.

My Lords, Office of Works, &c., 10 October 1856.

By Sir C. Trevelyan's letter of the 30th July last I was informed that your Lordships had directed the Paymaster-general to advance 10,000 *l.* from Civil Contingencies, and transfer it to the account of this Board, to enable the Board to pay the same to Sir C. Barry on account of his remuneration for his professional services as architect of the New Palace of Westminster, and I was requested to make provision for the repayment of that advance, and for the further payments to be made on account of Sir C. Barry's remuneration in the next year's Estimates.

The above mentioned sum of 10,000 *l.* was accordingly paid to Sir C. Barry on the 31st July.

I now beg leave to transmit to your Lordships a Statement which has been prepared in this Office, showing the whole of the amount of remuneration which Sir C. Barry was entitled to receive for the services in question, under the authority of your Lordships' Minutes of the 29th January and 22d July last, from the commencement of the building to the 2d October 1854 (exclusive of the sum of 4,925 *l.* paid to him in August last, for his services in regard to the warming, ventilating, and lighting of the Palace), and also showing the payments made to him at different periods on account of those services.

From that Statement your Lordships will see that the balance remaining due to Sir C. Barry is 5,476 *l.* 9 *s.*, which sum I request your Lordships will be pleased to cause to be placed to the account of this Board with the Paymaster-general, out of such funds as your Lordships shall deem proper, for the purpose of enabling this Board to pay the amount to Sir C. Barry, the same to be repaid to those funds when a Vote of Parliament shall be obtained for that purpose.

I am, &c.
(signed) *B. Hall.*

The Right Hon. Lords Commissioners of
Her Majesty's Treasury.

New Houses of Parliament.

Sir *Charles Barry*'s Professional Remuneration upon Accounts certified by him, from the Commencement to 2d October 1854.

A statement of the amounts certified by Sir C. Barry, to the above date, has been prepared and examined, at 1,506,189 *l.* 16 *s.* 5 *d.*

The Treasury Minute of 29th January 1856, confirmed by subsequent Treasury Minute of 22d July last, appears to sanction a remuneration to Sir C. Barry, at the rate of 4 per cent. upon the gross amount certified by him for payment; excepting that portion which has reference to the current expenses of warming, lighting, and ventilating, for which services it is proposed to remunerate the architect under a separate arrangement, as set forth in Treasury Minute of 22d July last.

In making up the amount referred to in this memorandum, the current expenses for warming, lighting, &c., have not been included.

Among the items, however, which are included in the gross amount stated, is a sum of 2,396 *l.* 14 *s.* 4 *d.* for the cost of removing the coffer-dam required in the construction of the river wall and embankment. This service being under a distinct and previously recognised arrangement, should in strictness be excluded from the operation of the Treasury Minutes referred to. The following statement, showing the amount which now appears to be due to Sir Charles Barry to October 1854, is calculated upon that principle.

	£.	s.	d.
Total amount of accounts certified by Sir C. Barry, as shown in statement - - - - - - - - - - - - - -	1,506,189	16	5
Deduct cost of removal of coffer-dam - - - - - - -	2,396	14	4
Amount subject to the operation of the Treasury Minutes referred to - - - - - £.	1,503,793	2	1

4 per

	£.	s.	d.	£.	s.	d.
4 per cent. commission on the above amount - - - - - -				60,151	14	5
On account of which Sir C. Barry has received,— Under the original Treasury regulation of 28 February 1838 - - - - - -	24,735	3	9			
Payments under subsequent Treasury authorities:						
10 September 1850 - - - - -	5,000	–	–			
January - 1852 - - - - -	5,000	–	–			
21 July - - 1853 - - - - -	5,000	–	–			
2 October - 1854 - - - - -	5,000	–	–			
30 July - - 1856 - - - - -	10,000	–	–			
				54,735	3	9
			£.	5,416	10	8
Cost of removing coffer-dam - £. 2,396. 14. 4.						
2½ per cent. commission on the above amount - - - - - -				59	18	4
Amount due to Sir C. Barry - - - - - £.				5,476	9	–

STATEMENT of all Amounts certified by Sir *C. Barry*, for Payment for Works done, Articles supplied, and Services performed, in the erection of the New Houses of Parliament, and for Fittings, Finishings, and Furniture to the same (exclusive of the cost of the River Wall and Embankment), and of all Charges for Superintendence, and Expenses connected therewith, from the Commencement to 2 October 1854.

		£.	s.	d.	£.	s.	d.
Amount of accounts - - - - - - -		1,445,441	10	7¾			
Wood-carvers' wages - -	£. 50,333 3 10						
Stone „ „ - -	8,018 7 8						
		58,351	11	6			
F. & H. Flower, coffer-dam, &c. - - - -		2,396	14	4			
					1,506,189	16	5¾

From Sir *C. Trevelyan* to Sir *B. Hall.*

Sir, Treasury Chambers, 20 October 1856.

I am commanded by the Lords Commissioners of Her Majesty's Treasury to acquaint you, that directions have been given to the Paymaster-general to advance from Civil Contingencies (the same to be repaid out of the Vote to be obtained next Session for the New Houses of Parliament) the sum of 5,476 *l.* 9 *s.* to enable you to pay the balance of remuneration due to Sir C. Barry up to the 2d October 1854, for his professional services as architect of the New Palace at Westminster; and I am to request that provision may be made for the same in the Vote accordingly.

I am, &c.

The First Commissioner of Works. (signed) *C. E. Trevelyan.*

From Mr. *Austin* to Sir *Charles Barry.*

Sir, Office of Works, 5 November 1856.

I am directed by the First Commissioner of Her Majesty's Works, &c., to acquaint you that your accounts for services performed in the erection of the New Palace at Westminster, from the 2d October 1854 to the 30th June last, which were sent in by you, with your letter of the 21st August last, have been examined in this office, and that in such examination they have been reduced, under various heads of per-centage, to the amount of 218 *l.* 5 *s.* 8 *d.*, viz , from 5,688 *l.* 4 *s.* 4 *d.* to 5,469 *l.* 18 *s.* 8 *d.*

An order for payment of the last-mentioned sum will therefore be prepared and transmitted to you with as little delay as possible.

I am, &c.
(signed) *Alfred Austin,*
Secretary.

Sir C. Barry.

From Sir *Charles Barry* to Mr. *Austin.*

Brighton, 21 November 1856.

Sir,

I HAVE to acknowledge the receipt of your letter of the 5th instant, and subsequently an order for the payment of 5,469 *l.* 13 *s.* 2 *d.* on account of my services, as the architect of the New Palace at Westminster, from the 2d October 1854 to the 30th June last.

In your letter, you state that upon the examination of my account for such services, delivered on the 21st August last, the sum of 218 *l.* 5 *s.* 6 *d.* had been deducted from the amount of my claim, leaving a balance in my favour of 5,469 *l.* 13 *s.* 2 *d.*

I have therefore to request that I may be favoured with a statement of the items in my account which have been objected to, and also the reasons for their disallowance. An explanation of the discrepancy between the amount of the balance, stated in your letter of the 5th instant, to be due to me upon the accounts in question and the amount of the order for payment is also requested.

I am, &c.
(signed) *Charles Barry.*

Alfred Austin, Esq.

From Mr. *Austin* to Sir *Charles Barry.*

Office of Works, &c., 22 Nov. 1856.

Sir,

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acquaint you that he has had his attention drawn to the fact that you have supplied the following articles to the rooms and offices in the west front of the New Palace at Westminster, about to be occupied by the House of Lords, viz:—

On the Ground Floor.—Wainscot glazed bookcases, with drawers, to No. 10 Room.

On the One-pair-Floor.—Wainscot presses, &c. with pannelled doors, to No. 10 Rooms.

On the Upper Floor.—Deal presses, &c., to No. 10 Rooms.

And I am to state that the First Commissioner considers these articles in the light of furniture, and, as such, is of opinion that they ought to have been supplied by this department.

I am directed at the same time to refer you to that portion of the Treasury Minute of the 4th July last, which regards the works upon which you are to be allowed the commission of one per cent. for measuring.

I am, &c.
(signed) *Alfred Austin,*
Secretary.

Sir C. Barry.

From Sir *Charles Barry* to Mr. *Austin.*

Office of Works, &c., 26 Nov. 1856.

Sir,

I HAVE to acknowledge the receipt of your letter of the 22d inst., respecting the bookcases and presses in the rooms of the several officers and clerks of the Parliament office, in the west front of the New Palace at Westminster; and to acquaint you that I entirely dissent from the opinion of the First Commissioner of Works, &c., in considering those articles as furniture.

They in fact form part of the fittings and finishings of the rooms in which they are fixed, and, unlike furniture, cannot be removed without committing waste and defacement, and requiring other work to be substituted to complete the finishings of the rooms in question. Indeed, these rooms could not have been properly completed, and even the position, in some cases, of the doors and fire-places could not have been determined until the exact size, form and position of these bookcases and presses were arranged, and consequently considerable pains and trouble have been incurred in ascertaining minutely the wishes of the intended occupants of every room on the subject, for which an allowance of ten per cent. upon the cost of these works would not be more than an adequate remuneration. They are, in short, so essentially fittings, as to be included under the head of finishings, and provided for accordingly in the contract for the works of the building.

Under these circumstances, I do not consider that the Treasury Minute of the 4th July last, to which you refer, has any reference, as regards measuring, to the works in question.

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

From Mr. *Austin* to Sir *Charles Barry.*

Sir, Office of Works, &c., 28 Nov. 1856.

THE First Commissioner of Her Majesty's Works, &c., has had before him your letter of the 21st inst., requesting to be furnished with a statement of the items, amounting in all to 218 *l.* 5 *s.* 8 *d.*, which have been disallowed in your account for your services as architect of the New Palace at Westminster, from the 2d October 1854 to the 30th June last, and also with the reasons for their disallowance. And I am directed by him to transmit to you herewith the statement requested by you, by which you will see that the amount disallowed is 218 *l.* 11 *s.* 2 *d.*, instead of 218 *l.* 5 *s.* 8 *d.*, as previously stated to you.

I am also directed to inform you that the reason of this disallowance is, that the Treasury Minute regulating the payment of your services does not sanction such charges.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin,*
Secretary.

NEW HOUSES OF PARLIAMENT.

SIR C. BARRY'S COMMISSION.

STATEMENT of the Items in Sir *C. Barry's* Account of Amounts certified by him, from 2 October 1854 to 30 June 1856, upon which the Commission of 3 per Cent. and 1 per Cent. respectively have been disallowed.

	£.	s.	d.	£.	s.	d.
3 per Cent. for superintendence has been disallowed upon the following Amounts:—						
Bills for stationery	269	2	9			
Mr. C. H. Smith's account for journey to Anston to report upon stone	12	15	–			
One and a half year's salary of Mr. Thomas, superintendent of stone-carvers	450	–	–			
Coals supplied to Clerk of Works' Offices	48	11	9			
Clerical corrections upon accounts, resulting in a deduction of 15 *l.* 0 *s.* 7 *d.* from the amount of accounts as rendered by the architect	15	–	7			
	795	10	1	= 23	17	3
Allowed to Sir C. Barry upon accounts not claimed by him, viz., upon 27 *l.* 10 *s.* 1 *d.*, the amount of bills for disbursements for stone-carvers, at 3 per cent.				–	16	6
Carried forward - - - £.				23	–	9

	£.	s.	d.
Brought forward - - -	23	–	9

The additional 1 per Cent. for measuring, &c., has not been allowed upon the following Amounts:—

Dates of Certificates.		£.	s.	d.
27 Nov. 1854	Upton for coals - - - - -	39	12	6
„ „	Ditto - ditto, Thames Bank - -	94	17	–
„ „	Taylor & Co., carving machines -	124	8	7
22 Feb. 1855	Gillow, for furniture - - -	4,227	16	6
24 April „	J. C. Crace, window curtains and carpets (part of bill of 2,564 *l.* 2 *s.* 8 *d.*), including paper hanging - -	2,083	11	8
„ „	Taylor & Co., carving machines -	26	19	2
„ „	Upton, for coals - - - -	157	17	6
„ „	Ditto - ditto, Thames Bank - -	158	2	–
16 June „	Gillow & Co., for furniture - -	1,844	8	9
18 Aug. „	Taylor & Co., carving machines -	25	18	2
„ „	Chartered Gas Company, for coke -	27	10	–
16 Nov. „	Taylor & Co., for carving machines -	25	–	–
1 Feb. 1856	Holl & Co., for coals - - -	44	16	–
„ „	Taylor & Co., carving machines -	25	–	–
15 May „	Holl & Co., for coals - - -	67	10	–
„ „	Chartered Gas Company, for coke -	5	10	–
„ „	Ditto - for ditto, Thames Bank	55	–	–
„ „	Taylor & Co., carving machines -	25	–	–
„ „	J. Fenn, cutters for machines - -	9	12	–
	Stone-carvers' wages, from 28th September 1854 to 26 June 1856 -	6,500	10	–
	Wood-carvers - ditto - - -	3,356	13	5
		18,925	13	3

	£.	s.	d.	£.	s.	d.
Deduct amount included above upon which 1 per cent. is not claimed by Sir C. Barry, viz., for coals supplied to Clerk of Works' Offices - - - - - -	48	11	9			
Amount upon which Sir C. Barry's claim of 1 per cent. is disallowed in respect of the foregoing items - -	18,877	1	6			
Also amounts on which no commission whatever has been considered as payable, 795 *l.* 10 *s.* 1 *d.* [*vide* list of items at the beginning of this statement, on which 3 per cent. has been disallowed], but upon which, with the exception of 120 *l.* 10 *s.* 3 *d.* for stationery and coals supplied to the Clerk of the Works' Offices, Sir C. Barry claims a commission of 1 per cent. -	674	19	10			
TOTAL Amount of items upon which Sir C. Barry's Claim of 1 per Cent. has been disallowed - - - - £.	19,552	1	4			
Amount of Disallowance of 1 per Cent. upon the above amount - -				195	10	5
TOTAL Amount of Disallowance upon Sir C. Barry's claim for Commission - - - - - - - - £.				218	11	2

Memorandum,—

	£.	s.	d.
Total amount of Sir C. Barry's claims as sent in - - -	5,688	4	4
Amount disallowed, as per statement - - - - -	218	11	2
Amount of order for payment - - - £.	5,469	13	2

The discrepancy between the above amount, and the sum of 5,469 *l.* 18 *s.* 8 *d.*, which Sir C. Barry was informed by Board's letter of 5th November was the balance in his favour, arose from the items of expenditure for sundries supplied to stone-carvers, amounting to 27 *l.* 10 *s.* 1 *d.* having been inadvertently marked with the additional 1 per cent. for measuring, but upon revision reduced to 3 per cent. only, making a deduction of 5 *s.* 6 *d.*, which is 1 per cent. upon the amount in question.

From Mr. *Austin* to Sir *Charles Barry*.

Sir, Office of Works, &c., 9 December 1856.

WITH reference to your letter of the 26th ultimo, respecting the bookcases and presses in the rooms of the several officers and clerks of the Parliament Office, in the west front of the New Palace at Westminster, I am directed by the First Commissioner of Her Majesty's Works, &c., to inform you that before replying to that letter, the First Commissioner considered it necessary to see you, in order that he might fully understand your views in relation to fittings, and the grounds upon which you felt entitled to make a charge of per-centage on the cost of such works. He therefore requested to see you on the subject; and he collects from the conversation he had with you, that the bookcases which are made and are now in course of erection, were provided for in the Estimates of 1855-56, and ordered previous to the Treasury Minute of July 4th, and are considered by you as part of the fixtures of the New Palace of Westminster, and that they do not come under the instructions contained in the following passage of the Treasury Minute, "that an allowance for measurement of one per cent. should for the future be made only upon such accounts as require the services of a surveyor for their preparation, unless the architect should be authorised in writing by the First Commissioner of this Board, and with the approval of your Lordships' Board, to make any special charges for special works so authorised."

When the charge is made for per-centage on the amount of cost of such fittings, the First Commissioner will submit the same to the Treasury, and be guided by the decision of their Lordships in regard thereto. But with regard to any future fittings, the First Commissioner desires me to repeat the instructions he has already given, viz. that no fittings, such as bookcases, or any other fittings or fixtures partaking in any way whatever of the nature of furniture, be provided until he has approved of the same.

I am, &c.
Sir C. Barry, R. A. (signed) *Alfred Austin*,
Secretary.

From Sir *C. Barry* to Mr. *Austin*.

Sir, Westminster, 9 December 1856.

I HAVE to acknowledge the receipt of your letter of the 28th ultimo, enclosing a statement of the items which have been disallowed in my claim for professional services as the architect of the New Palace at Westminster, from the 2d October 1854 to the 20th June last; and assigning as a reason for their disallowance, that the terms of the Treasury Minute of the 4th July last do not sanction such charges.

On the item of 450 *l.* paid to Mr. Thomas, as modeller and carver in chief, I conceive, as I have before stated, that I am justly entitled to the accustomed professional allowance of 5 per cent., or, according to the terms of the Treasury Minute above mentioned, to 3 per cent. on that amount, seeing that this payment is as much a part of the cost of the work executed as the amount paid to the foreman and workmen employed in Mr. Thomas's department, upon which an allowance of 3 per cent. is admitted to be due to me.

On the cost of the stationery, coals, and gas supplied to the works of the New Palace, and the expenses of Mr. Smith's journey to the quarries, amounting in the aggregate to 1,029 *l.* 16 *s.* 3 *d.*, I conceive that if I am to be held responsible for the propriety and accuracy of the expenditure incurred under these several heads, I am equitably entitled, according to professional usage, to an allowance of 2 per cent. upon the amount expended, or even, according to the Treasury Minute of July last, of 1 per cent.; the whole of these accounts having been examined and certified by me as correct.

On the remaining items, amounting in the aggregate to 18,274 *l.* 18 *s.* 3 *d.* for work executed from my designs and instructions, the accounts for which have required the services of my surveyor to measure, number, check with contracts, and investigate generally, and have had my own time and attention devoted to them to examine, and certify as to the propriety as well as accuracy of the expenditure incurred; I consider that, according to professional usage and fairness, I am entitled to an allowance of 2 per cent., or even, in compliance with the terms of the Treasury Minute before mentioned, of 1 per cent. beyond what has been allowed upon the items in question.

Under these circumstances I cannot forbear to protest against these disallowances, as a further aggravation of the injustice of the Treasury Minute of the 4th July last, nor can I refrain from noticing, as a further proof, not only of the injustice, but also the inconsistency of the *ex parte* decision contained in that Minute, especially in its bearing on the future, the fact that in respect of the proposed new public offices, involving an expenditure probably of several millions of money, the Government itself has deemed it right to make an offer to the profession at large of the ordinary commission of 5 per cent., whilst allowing only 4 per cent. upon the works of the New Palace at Westminster.

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

From Mr. *Austin* to Sir *C. Barry.*

Sir, Office of Works, &c., 13 December 1856.

THE First Commissioner of Her Majesty's Works, &c., has had before him your letter of the 9th instant, objecting to the disallowance of the items, amounting in all to 218*l.* 11*s.* 2*d.*, in your account, for professional services as the architect of the New Palace at Westminster, from the 2d October 1854 to the 20th June last; and I am directed by him to inform you, that having duly considered the reasons stated in your letter for the payment of those items, he is still of opinion that, under the Treasury Minute of the 4th July last, the same cannot be allowed.

I am, &c.

Sir Charles Barry. (signed) *Alfred Austin*, Secretary.

From Mr. *Austin* to Sir *C. Barry.*

Sir, Office of Works, &c., 19 December 1856.

THE First Commissioner of Her Majesty's Works, &c., has had before him your account, amounting to 42*l.* 13*s.* 11½*d.*, for commission on sundry tradesmen's bills certified by you on the 20th ultimo, as architect of the New Palace at Westminster, and having caused the same to be examined in this office, I am directed to inform you that he is prepared to sanction the payment thereof, after deducting the commission of 1 per cent. for measuring on 53*l.*, the amount of Mr. Marr's and Messrs. Taylor and Co.'s bills, which he is of opinion cannot be allowed.

The sum payable to you after making this decuction is 42*l.* 3*s.* 4*d.*, for which an order will be prepared on your stating your willingness to accept that sum in payment of the account above mentioned.

I am directed to add, with reference to the bill of Mr. Marr for an iron safe, which the First Commissioner understands was provided for the use of Mr. Green, Table Clerk to the House of Peers, that he objects to such expenses being incurred without his authority, and that, for the future, a special order from this office must be obtained for every description of furniture and fittings required at the New Palace.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin*, Secretary.

From Sir *C. Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 23 December 1856.

I HAVE to acknowledge the receipt of your letter of the 19th instant, informing me that the First Commissioner of Works, &c., has disallowed a portion of my last claim for commission on the current expenditure upon the New Palace at Westminster, and in reply I have to inform you that, for the reasons set forth my recent communication, I yield, from necessity alone, to that decision, although I do not admit the justice of it.

In doing so, however, I think it right to state that the claim in question, although made, as I consider, in accordance with the dictum of the Treasury, in its Minute of July last, falls far short of my just and legitimate claims, and as I am utterly at a loss to draw the line as to what is and what is not due to me, according to the equivocal terms of that Minute, I propose in future to make no further claims, but to leave it to the First Commissioner to pay me from time to time what, in his sense of justice and propriety, he may think proper.

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

From Mr. *Russell* to Sir *C. Barry.*

Sir, Office of Works, &c., 29 December 1856.

THE First Commissioner of Her Majesty's Works, &c., has had before him your letter of the 23d instant, on the subject of the disallowance of a portion of your last claim for commission on the current expenditure upon the New Palace at Westminster, and with reference to your statement that you are at a loss to draw the line as to what is due to you, according to the terms of the Treasury Minute, you purpose in future to make no further claims, but to leave it to the First Commissioner to pay you from time to time what in his sense of justice and propriety he may think proper, I am directed to inform you that it will be your duty to make your claim in accordance with the Treasury Minute, and that if you do not understand the nature of that Minute, you should say so, and ask for explanation upon such points as you consider unintelligible, which information the First Commissioner is quite sure the Lords Commissioners of Her Majesty's Treasury will readily afford.

It will of course be the duty of the First Commissioner to disallow any items of charge in your accounts that he may consider at variance with the provisions of the Minute, but if you think he is wrong in the construction which he puts upon it, you have only to state your opinion to that effect, and the First Commissioner will immediately refer the matter to the Treasury.

He must, however, desire that you will act up to the instructions already given, and that when you send certificates of accounts for payment, you will at the same time send your charge for per-centage.

I am, &c.
(signed) *George Russell,*
Assistant Secretary.

Sir C. Barry.

From Sir *C. Barry* to Mr. *Russell.*

Sir, Old Palace Yard, 31 December 1856.

I HAVE to acknowledge the receipt of your letter of the 29th instant, with reference to my commission on the current expenditure upon the works of the New Palace at Westminster.

In reply, I have to state that I cannot admit it to be my duty to make any further claims for my services in respect of those works; I am indeed well aware that it would be consonant with practice so to do, but the position in which I am placed is one wholly unprecedented in the experience of the profession, and therefore I feel that I am at perfect liberty to take any course in that respect that I may think proper.

With reference to the observation in your letter that if I do not understand the nature of the Treasury Minute of July last "I should say so," I beg to remind the First Commissioner that I have by letter on three several occasions objected to his interpretation of that Minute, and have stated my reasons in detail, without receiving in reply one word of explanation from him in consequence.

Under these circumstances, looking at the principle of dictation upon which the Treasury Minute in question is founded, its equivocal nature, and the interpretation of that Minute by the First Commissioner, which I consider to be not only erroneous but an aggravation of the terms of it, I conceive it to be due to myself to avoid the possibility of making any further claims that can be objected to. Nothwithstanding, therefore, the desire of the First Commissioner to the contrary, I regret to state that I must adhere to the course proposed in my letter to Mr. Austin of the 23d instant.

I am, &c.
(signed) *Charles Barry.*

George Russell, Esq.

From Mr. *Russell to* Sir *C. Barry.*

Sir, Office of Works, &c., 3 January 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 31st ultimo, further acquainting him with the views which you entertain in regard to your commission on the current expenditure upon the works of the New Palace at Westminster.

In reply, I am to inform you that the First Commissioner has read with much surprise the statement contained in this letter, that you have not received "one word of explanation from him" in reply to the objections you have taken to this Board's interpretation of the Treasury Minute of last July; in regard to this statement, the First Commissioner directs me to observe, that when he has seen you at this office he has entered very fully into the subject with you, and has distinctly told you that, if your desired it, he would submit any points of difference to the Treasury, but that he has never understood that you wished that he should do so.

I am now to acquaint you that having had before him the expression of your opinions contained in your letter of the 31st ultimo, the First Commissioner can only say that if you will send him a letter embodying the points upon which you consider that an erroneous view has been taken by this Board of the intentions of the Treasury Minute, he will immediately submit such letter to the Treasury for their Lordships' consideration and instructions.

In conclusion, I am to assure you of the desire of the First Commissioner simply to carry out the real meaning of the Treasury Minute, so that all payments to be made to you shall not exceed, or be less than, those which are contemplated in the arrangement made by the Treasury.

I am, &c.
(signed) *George Russell,*
Assistant Secretary.

Sir C. Barry.

From Sir *Charles Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 8 January 1857.

I HAVE to acknowledge the receipt of your further letter of the 3d inst., on the subject of my remuneration as the architect of the New Palace at Westminster.

In reply, I have to state that I did not anticipate there could be any feeling of surprise in the mind of the First Commissioner at the complaint contained in my letter to you of the 31st ultimo, as to the mode in which my claims have been dealt with by him; and I can only attribute that surprise to an imperfect recollection, on his part, of the circumstances which have transpired. In my own justification, therefore, I feel it right to recall the following facts to his recollection: In the first place, I beg to refer to your letter of the 4th September last, which contains a repudiation of my claim upon the cost of the plate, linen, &c., supplied to the House of Commons, wherein you state that my claim of commission upon the salary paid to the stone carver in chief cannot be allowed, because, in the opinion of the First Commissioner, it is not justified by the terms of the Treasury Minute of July last; without, however, offering any explanation in reply to my arguments to the contrary. Secondly, to your letter of the 2d October last, containing an announcement that the First Commissioner cannot alter his decision, but still without affording any explanation in reply to the further arguments which I had set forth in my letter to you of the 8th of the previous month. Thirdly, to a letter from Mr. George Russell on the 5th November last, in which a reduction in my claim is announced, without any specification of the items deducted, or any explanation whatever of the principle of such reduction. Fourthly, to a letter from yourself on the 28th of the same month, enclosing, according to my request, a specification of the items deducted, and merely announcing the opinion of the First Commissioner that the terms of the Treasury Minute did not justify the claims disallowed. Fifthly, to another letter from yourself on the 13th December last, announcing the continued adherence of the First Commissioner to his own opinion, but not assigning any reasons for his refusal to change it, other than that according to the terms of the Treasury Minute the claims in question could not be admitted; and lastly, to your letter of the 19th ultimo, announcing a further reduction in my claims, simply because they cannot be allowed.

Upon a review of these circumstances, the First Commissioner cannot, I think, be surprised at the complaint contained in my letter to you of the 31st ultimo, nor can he, I think, expect that I can submit to being placed in the humiliating position of having my claims constantly disallowed without any sufficient answer to my objections, and thereby lay myself open to the imputation of endeavouring to obtain more than is justly due to me. It is only, therefore, under a painful conviction that my differences with the Government in respect of my claims as architect of the New Palace at Westminster are irreconcilable, that for the sake of avoiding the constant misunderstandings, which cannot but be consequent upon the equivocal nature of the Treasury Minute of July last, and its disregard of all established precedent, I intend to make no farther claims upon the Government, but have resolved to leave the entire question of my remuneration, for the future, in the hands of the First Commissioner of Works, &c., for him to deal with as he may think proper.

With reference to that portion of your letter wherein you state that the First Commissioner has, in interviews with me at the office, entered fully into the subject of my remuneration, and has offered to submit any objections on my part to the Treasury, he must, I think, have forgotten that the only interview I have had with him recently, which had any bearing on that subject, was with reference to the presses and bookcases in the Peers' Offices; for which, however, no claim had then been made on my part; when he certainly did enter into that subject with me, but did not touch upon any of the several objections which I had made to his previous disallowances, upon which no personal discussion had ever taken place between us. I have no recollection of the offer you mention on the part of the First Commissioner, to refer my claims to the Treasvry, in case I wished it; but I distinctly remember that he stated his own intention to refer the only subject then in question to the Treasury, and your letter to me of the 9th ultimo confirms this fact.

With reference to the offer of the First Commissioner, that if I would now embody in a letter to him my objections to his interpretation of the Treasury Minute of July last, he will submit such letter to the Treasury, I have only to state that, after the treatment which I have received, I think it useless to avail myself of his offer, for which, however, I beg to tender him my thanks; but if I were otherwise disposed, there would be no occasion for such a letter from me, inasmuch as I have already fully set forth my objections in the several letters addressed to the Board, which have given rise to the correspondence to which I have already alluded.

In conclusion, I have to thank the First Commissioner for the expression of his desire to do neither more nor less than is warranted by the terms of the Treasury Minute of July, which under the unprecedented circumstances of the case is all that I can fairly expect of him in his position.

I am, &c.
(signed) *Charles Barry.*

Alfred Austin, Esq.

From Mr. *Austin* to Sir *C. Barry.*

Sir, Office of Works, &c., 9 January 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to call your attention to my letter to you of the 19th ultimo, stating that an order would be prepared for 42 *l.* 3 *s.* 4 *d.* in payment of your account for commission on sundry tradesmen's bills certified by you on the 20th November last as architect of the New Palace at Westminster, upon your stating your willingness to accept that sum in discharge of such account, to which letter no reply has been received from you.

I am, &c.

Sir Charles Barry. (signed) *Alfred Austin*, Secretary.

From Sir *C. Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 10 January 1857.

IN reply to your letter of yesterday's date, I beg to refer you to my letter to you of the 23d ultimo, wherein you will find that I yielded to the decision of the First Commissioner as to my commission upon sundry tradesmen's bills certified by me on the 20th November last, and I have been therefore expecting the promised order for 42 *l.* 3 *s.* 4 *d.* ever since.

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

From Mr. *Austin* to Sir *C. Barry.*

Sir, Office of Works, &c., 12 January 1857.

THE First Commissioner of Her Majesty's Works, &c., has had before him your letter of the 8th instant further on the subject of your remuneration as the architect of the New Palace at Westminster, and I am directed by him to inform you that he will at all times be most happy to submit to the Lords Commissioners of Her Majesty's Treasury any points upon which you and he may differ, in order that they may be adjusted, and that he believed that at the last interview which he had with you he had fully expressed himself to that effect.

As, however, you have again declared in your letter that you will not make any charge for remuneration when the accounts are sent in certified by you, but will leave the whole to the First Commissioner, he will endeavour to settle the amount in strict conformity with the Treasury Minute, and he will still hope that, if you should be of opinion that the settlement so proposed is not in conformity with the spirit and intent of that Minute, you will inform him of any supposed error; but it will be necessary for you to do so as soon as possible after the receipt by you of the statement, so that the matter may be closed without delay, or the possibility of any running account.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin*, Secretary.

From Sir *C. Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 14 January 1857.

I HAVE to acknowledge the receipt of your further letter of the 12th instant, relative to my remuneration as the architect of the New Palace at Westminster, and am anxious that you should express to the First Commissioner of Works, &c., my best thanks for the offer which he is pleased to make, in respect of any points upon which we may be at issue, relative to the Treasury Minute of July last; but I regret to say that, for the reason which I gave in my last letter, I still think it useless to avail myself of his considerate proposal. I am well aware of the peculiar position in which the First Commissioner is placed in respect of that Minute; and although I have differed, and still differ with him, in respect of the construction which he has put upon it in several cases, I have no reason to doubt but that he has been desirous to interpret it in as fair a spirit as its terms permit.

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

From Mr. *Austin* to Sir *Charles Barry*.

Sir, Office of Works, &c., 10 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to send you the enclosed directions, and to request that you will have the goodness to act in conformity with them in your future applications for imprests.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin*, Secretary.

APPLICATIONS FOR IMPRESTS.

From and after the 14th instant, the accompanying form of letter for imprest is to be substituted by the sub-accountants to the Office of Works, for the present estimate paper, in making applications for imprests.

In using the new form the following directions are to be observed:—

A. Should a sub-accountant be charged with payments out of more than one Vote of Parliament, a separate letter is to be sent to the Office for the amount required in respect of each Vote.

(*Note.*—As the whole of the "Royal Parks and Pleasure Gardens" are included in one Vote, sub-accountants, having under their charge two or more services included in that Vote, are to state in one letter the total amount required by them for those services).

B. Applications for imprests are to be made weekly, and are to be sent to the Office on Tuesday.

C. The sum applied for should be an even sum, without shillings or pence.

D. Should a sub-accountant have made payments beyond the amount received by him, the words "in addition to the balance of £.__ ,, ,,__ remaining in my hands," are to be struck out, and the words. "there being a balance of £.__ ,, ,,__ due to me at this date," are to be added at the end of the letter.

With the application for imprest, it will be necessary to forward the pay lists for the preceding week.

Should a larger amount than usual be required in any week, an explanation of the circumstances under which the application is made is to be given on the third page of the letter.

The monthly account current (accompanied by the abstracts of sums received and sums paid) is to be sent to the Office within four days after the end of each month.

Office of Works, &c., 10 February 1857.

A. VOTE ______________________________

B. __________ ending the __________ 185 .

__________________ 185 .

Sir,

C. I beg to report that a further imprest of £. : : , will be
D. required by me in addition to the balance of £.__:____:____, remaining
in my hands, to enable me to make the payments during the ______
ending as above, on account of the services under my charge, included
in this Vote.

I am,
Sir,
Your obedient Servant,

____

To the Secretary,
Office of Public Works, &c.

From Sir *C. Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 18 February 1857.

ADVERTING to our recent correspondence in respect of my remuneration for the New Palace at Westminster, whereby I have now placed myself in the hands of the First Commissioner of Her Majesty's Works, Public Buildings, &c., to make such allowances in future as he may consider just and proper, I deem it right in my own vindication to forward to you the enclosed protest, in order to show that I have not opposed myself to the continual reductions which have been made in my just claims vexatiously or upon unimportant or insufficient grounds.

I am, &c.
(signed) *Charles Barry.*

Alfred Austin, Esq.

NEW PALACE AT WESTMINSTER, 1856.

Architect's Remuneration.

PROTEST of the ARCHITECT against the Decision formed by the Lords Commissioners of Her Majesty's Treasury in respect of his Claims, and enforced on the plea of an alleged Bargain between him and the Government of 1839.

Firstly. BECAUSE the alleged bargains was, in fact, no bargain, in the true sense of the term, but a dictum of the Government of 1839, issued after 19 months' progress had been made with the works by the architect, upon the understanding of receiving his accustomed commission of five per cent. upon outlay, and in contravention of an allowance made by the authorities in the Department of Woods and Works of that rate of commission, which was added by them to the amount of his estimate, as approved by Parliament; and because, that although this dictum, which, contrary to all precedent and professional usage, had the effect of reducing the just claims of the architect to the extent of 10,000 *l.*, was yielded to by him at the time under pressure, his acquiescence was conditional, and under a protest both then and on various subsequent occasions made by him as to its injustice, without any rejoinder on the part of the Government, all payments made to the architect from time to time in the interval having been received by him as only on account.

Secondly. Because, even if it be assumed, for the sake of argument, that the dictum of the Government of 1839 constituted a bargain, the circumstances have been entirely altered, and the conditions upon which it was based have been altogether violated, from no fault on the part of the architect, whereby such bargain would be rendered null and void.

Thirdly. Because the principle of dictation, adopted by the Government of 1839 towards the architect, was ordered by the Treasury at the same time to be applied to the profession at large, in respect of all future public buildings thereafter erected, but has never been so applied in any single instance. On the contrary, the architects of all public buildings, since erected and now in progress, have been paid, and are still being paid, at the accustomed rate of five per cent. upon outlay, and in some instances at even a higher rate of percentage.

Fourthly. Because, as the dictum of the Government of 1839 could not have contemplated any allowance for a general measurement of the works, (which works, being at first contracted for in the gross, rendered all such measurement on the part of the architect unnecessary,) the rate of commission now awarded to the architect by the Treasury, namely, three per cent. for the æsthetical, and less than one per cent. for the financial duties which have been unexpectedly thrown upon him, falls far short of the amount of remuneration sanctioned even by the dictum of the Government of 1839.

Fifthly. Because, considering the difficulties which the architect has encountered and overcome in conducting, during a period of nearly 20 years, the works of a building covering more than eight acres of ground, containing above 1,180 rooms, 19 halls, 126 staircases, and more than two miles of corridors, passages, &c., under eight successive Governments, subject to the interference and interruptions of 15 Parliamentary and other official inquiries, and to the constant and often contradictory orders resulting from opinions expressed both in and out of Parliament, involving extensive changes of plan, whereby no less than 12 official residences (now 18 all) and a large amount of extra accommodation have been provided beyond the accommodation afforded by the original design, thus increasing the cubical contents of the building more than 50 per cent., and occasioning constant revisions and recastings of the design of the entire structure; also considering the difficulties of carrying on the works piecemeal during the constant sittings of Parliament, in temporary structures, and in portions of the old and new buildings on the same site; the forming of the foundations of the building on a treacherous soil, partly within the river, and more than 16 feet below the level of high water, and other circumstances, the great amount of extra labours, anxieties, and responsibilities which have thereby been thrown upon the architect have not been duly appreciated.

Sixthly. Because it is evident that the Treasury must be aware of the injustice of its decision, inasmuch as it now invites the profession at large to compete for employment upon the intended new public offices (which are proposed to be on a scale of expenditure far greater than that of the New Palace at Westminster), on the understanding that the architect or architects to be employed will be paid the accustomed commission of five per cent. upon outlay.

Seventhly. Because, after every effort to have the case fairly tested upon its merits, and repeated offers on the part of the architect to abide by the result of an arbitration, on a broad and equitable principle, unfettered by legal technicalities, the Treasury has pertinaciously refused to accede to any arbitration whatever, and has determined to keep the case in its own hands, and to dictate its own terms.

And, lastly. Because, by the decision in question, which, practically, as is well known in all cases between an individual and the Government, leaves the architect little or no chance of a remedy at law, the Treasury has committed an act of injustice and oppression towards him, whereby the honour and good faith of the country are compromised.

(signed) *Charles Barry.*

In corroboration of the facts above stated, *vide* Parliamentary Papers, No. 491 of the Session of 1849, and No. 117 of that of 1856, containing the correspondence between the architect and the Government, wherein it will also be seen that many of the arguments of the architect, in justification of his claims, and his refutation of certain important statements of the Treasury, have never been answered.

(signed) *C. B.*

From Mr. *Austin* to Sir *Charles Barry.*

Sir, Office of Works, &c., 21 February 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 18th instant, containing a protest in reference to your remuneration as architect of the New Palace at Westminster.

I am, &c.
(signed) *Alfred Austin*, Secretary.

Sir Charles Barry.

My Lords, Office of Works, &c., 27 February 1857.

On the 20th instant I received a letter from Sir C. Barry, forwarding to me a protest against the decision of your Lordships in respect of his claims. I have carefully read this document, and think it to be my duty to transmit it for your Lordships' consideration.

I am, &c.
(signed) *B. Hall.*

The Right Hon. the Lords Commissioners
of Her Majesty's Treasury.

From Mr. *Russell* to Sir *Charles Barry.*

Sir, Office of Works, &c., 27 February 1857.

Adverting to your letter of the 18th instant, the receipt of which was acknowledged on the 21st instant, I am directed by the First Commissioner of Her Majesty's Works, &c., to inform you that, having carefully considered your protest, he has thought it to be his duty to lay it before the Treasury, and has forwarded it to their Lordships' Board accordingly.

I am, &c.
(signed) *G. Russell,*
Assistant Secretary.

Sir Charles Barry.

From Sir *C. Trevelyan* to Sir *B. Hall.*

Sir, Treasury Chambers, 3 March 1857.

With reference to your letter of the 27th ult, I am commanded by the Lords Commissioners of Her Majesty's Treasury to acquaint you, that before they reply to Sir C. Barry's representation protesting against the decision of this Board in respect of his claims, my Lords would wish to receive any observations which you may have to offer upon it.

I am, &c.
(signed) *C. E. Trevelyan.*

The First Commissioner of Works, &c.

From Mr. *Austin* to Sir *Charles Barry.*

Sir, Office of Works, &c., 5 March 1857.

I am directed by the First Commissioner of Her Majesty's Works, &c. to call your attention to the last paragraph of the instructions sent to you on the 10th February last, respecting applications for imprests, directing that the monthly account current (accompanied by the abstracts of sums received and sums paid) should be sent to this office within four days after the end of each month, and I am to request that you will cause the account current for February to be furnished without delay.

I am, &c.
(signed) *Alfred Austin,* Secretary.

Sir Charles Barry.

From Sir *Charles Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 9 March 1857.

I have to acknowledge the receipt of your letter of the 5th instant, respecting the imprests upon the cost of the wood and stone carving works at the New Palace at Westminster.

In reply, I have to acquaint you that I have hesitated to comply with the directions contained in your letter of the 10th ultimo, in respect of these imprests, in consequence of the First Commissioner's interpretation of the last Treasury Minute upon my claims; by which all remuneration whatever is refused for the services of my surveyor, and for my own duties and responsibilities in controlling the expenditure upon the works in question, and seeing to the proper appropriation of the imprests to the discharge of the claims in respect of them.

In order, however, to avoid probably some inconvenience to the Board, and in the hope that the First Commissioner may, upon further consideration, see the propriety of altering his decision in this matter before the next monthly return is due, I enclose the account current for February as requested.

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

From Mr. *Austin* to Sir *Charles Barry.*

Sir, Office of Works, &c., 3 April 1857.

THE First Commissioner of Her Majesty's Works, &c. has had before him your letter of the 9th ultimo, enclosing the account current for February, in regard to the imprests upon the cost of the wood and stone carving works, at the New Palace at Westminster, and stating that you had hesitated to comply with the Board's directions in respect of those imprests, in consequence of the First Commissioner's interpretation of the Treasury Minute upon your claims for remuneration, having reference to the works in question; but that you hoped, before the next monthly return, he would reconsider the matter, and alter his decision thereon. And I am directed to inform you that, taking into consideration the circumstance, that although the payments for the works above referred to are made by paid officers of this Board, without the money passing through your hands, you are the person upon whom the responsibility attaching to these payments must rest. In the event of any defalcation or irregularity occurring, the Board consent to allow you the additional one per cent. commission claimed by you, it being however distinctly understood that the proposed additional remuneration has no reference to the salaries of Mr. Thomas and Mr. Bayne, upon which it is clear by the Treasury Minute that you are not entitled to any commission whatever.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin,* Secretary.

From Sir *Charles Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 14 April 1857.

I HAVE to acknowledge the receipt of your letter of the 3d instant, stating that the First Commissioner of Her Majesty's Works, &c., is, for the reasons therein stated, willing to make an allowance to me of 1 per cent. for my financial duties and responsibilities connected with the cost of the wood and stone carving works of the New Palace at Westminster, with the exception, however, of the salaries paid to Mr. Thomas and Mr. Bayne, upon which you state that it is clear by the Treasury Minute that I am not entitled to any commission whatever.

I have, therefore, to beg of you to remind the First Commissioner that Mr. Thomas and Mr. Bayne cannot fairly be considered as in the same category; the former is an artist workman, the latter is simply a clerk of works, and no workman; the salary of the former is an agreement which I have made with him, in lieu of specific charges, for work and labour done by his own hand, and is therefore as much a part of the cost of the work produced as the salary of Mr. Potts, the wood carver in chief, which is properly admitted to be chargeable with commission; the latter is simply a clerk of works, whose duties are confined to overlooking, and not producing work, upon whose salary I have no claim whatever for commission. I trust, therefore, that upon a farther consideration

ration of these and the other circumstances stated in former communications, the First Commissioner will admit the justice and propriety of allowing commission upon Mr. Thomas's salary, and will feel that he can do so without any departure from the spirit of the Treasury Minute alluded to in your letter.

I am, &c.
Alfred Austin, Esq. (signed) *Charles Barry.*

From Sir *B. Hall* to the Treasury.

My Lords, Office of Works, &c., 24 April 1857.

On the receipt of Sir C. Trevelyan's letter of the 3d ultimo, stating that before your Lordships replied to Sir C. Barry's representation protesting against the decision in respect of his claims, your Lordships wished to receive any observations which I might have to offer upon it, I referred that letter to Mr. Hunt, the Surveyor of Works and Public Buildings, for his observations, and I beg leave to send your Lordships herewith copy of the report which that officer has submitted to me upon the subject.

I am, &c.
The Right Hon. the Lords Commissioners of Her Majesty's Treasury. (signed) *B. Hall.*

New Palace at Westminster.

Sir *C. Barry's* Protest, received 20th February 1857.

I thought that the Treasury Minute of 4th July 1846, had entirely settled the question relating to Sir C. Barry's remuneration, and that his letter of the 23d December 1856, and his subsequent receipt of the balance due to him according to that Minute, together with the payments since made to him upon the same basis, were such an acquiescence on the part of Sir C. Barry in the decision of the Treasury, that any further protest from him would not have been presented.

The substance of the protest is simply this, that no bargain was made by the Government with Sir C. Barry in 1839, and that he is consequently entitled to the accustomed commission of 5 per cent. upon the outlay.

Now with reference to the first point, the correspondence which passed between Sir C. Barry and the Government in 1839, can leave no doubt on the the mind of any person, that 25,000 *l.* was the amount of remuneration agreed on by both parties for Sir C. Barry's time, trouble, and expenses, in the superintendence, direction, and completion of the intended new building; and it is equally clear that that sum was in lieu of the customary commission of 5 per cent., and was to be Sir C. Barry's compensation for all the duties which that commission imposes upon an architect, including the measurements and adjustment of the accounts.

It is not necessary, for the present purpose, to enter into the causes which have led to the large excess of expenditure over the original estimate, because Parliament has sanctioned the increased expenditure by annual grants of money; but it is necessary to observe, that the Government of the present day have so far departed from the bargain of 1839 as to consent to pay Sir C. Barry, practically, at the rate of 4 per cent. upon the total outlay, which is a higher rate of percentage than Sir C. Barry would have received by a payment of 25,000 *l.*, if his original estimate of 707,104 *l.* had not not been exceeded.

But Sir C. Barry stated that the building is increased in extent 50 per cent.: if this be so, his original estimate of 707,104 *l.* should be increased in like proportion, or, say 1,050,000 *l.* Now I think that the ultimate cost will not be far short of 2,000,000 *l.*, or an increase upon the original estimate of nearly 1,000,000 *l.*, over and above the first estimate and the 50 per cent. alluded to. No doubt, part of this large sum has been expended on fittings and furniture, but it also cannot be doubted that the larger portion of the excess is occasioned by the adoption of a costly and elaborate mode of finishing, both external and internal, by the introduction of stained glass windows, by the brass and gold which abound in every part of the edifice, and the other numerous costly decorations which meet the eye at every turn.

Throughout the whole of the correspondence upon this subject, Sir C. Barry has aimed at obtaining a commission of five per cent., which he states is the usual and customary remuneration, forgetting that the Government of 1839 ignored altogether that principle of remuneration as applied to this building. And certainly there are many reasons why five per cent. should not be universally adopted as a rule for remunerating an architect for his services. Suppose, for example, that this building, instead of being erected and finished with its present costly materials, had been constructed with brick and cement, and that deal had been used instead of oak, and iron instead of brass, the cost would, in all probability, have been diminished 50 or 60 per cent.; nevertheless, according to Sir C. Barry's views, the usual commission of five per cent. would have been the proper remuneration. Now, as his labour and responsibility would have been the same in both cases, it follows that if five per cent. is a proper remuneration in one case it cannot be so in the other.

Again, in one of Sir C. Barry's recent letters to the First Commissioner (3d March 1857), he accounts for an excess over his estimate for the last year, by stating that Mr. Jay's new contract is 50 per cent. higher than his former one, which had been in force for four years. Now, if five per cent. was a proper remuneration during those four years, how can it be so at the present time, when the outlay is increased 50 per cent. without any corresponding increase of the labour of the architect? It is possible that considerations of this nature might have influenced the Government of 1839 in adopting a fixed sum for Sir C. Barry's remuneration, instead of the ordinary mode of payment by commission.

When Sir C. Barry speaks of the labour imposed upon him during nearly 20 years of his life, in designing and superintending the vast edifice of the Houses of Parliament, which will, as I have stated, probably cost 2,000,000 *l.*, and intimates that 4 per cent. (or 80,000 *l.*) will be an insufficient remuneration for his services, I think that any unprejudiced person will say that 4,000 *l.* per annum for 20 successive years, derived from a single source, is a reward not only unprecedented in the practice of architecture, but which I make bold to say the greatest architect that ever lived would have rejoiced at the opportunity of obtaining. It should also be remembered, that during this long period Sir C. Barry has received an additional sum of 5,000 *l.* for the ventilation and warming of the building, and large sums of money for other Government works, such as the Board of Trade, Trafalgar-square, the Horse Guards, and the temporary accommodation for the Houses of Parliament. He has, moreover, not been prevented during that period from following a large private practice.

It is hardly reasonable, therefore, taking all these circumstances into consideration, for him to state that the Government has committed an act of injustice and oppression towards him, whereby the honour and good faith of the country are compromised.

With regard to the difficulties which Sir C. Barry states he has met with and overcome, in conducting the works of this building under successive Governments, the interference and interruptions of 15 Parliamentary inquiries, and the constant and often contradictory orders, resulting from opinions expressed both in and out of Parliament, it may fairly be asked whether, if Sir C. Barry had had the expenditure of an equal amount in the erection of 50 mansions of the nobility and gentry in various parts of the country, each differing in style and accommodation, and had been obliged to carry out the wishes, and consult the feelings and tastes of the same number of employers, his trouble would not have been vastly greater than it has been in conducting the works of one building, uniform in style, with great repetition of the same details? I think there can be no doubt whatever upon that subject, except that there might have been a difficulty in one architect meeting with 50 employers in the space of 20 years, able and willing to expend 40,000 *l.* each in building mansions.

Sir C. Barry states that it is evident that the Treasury must be aware of the injustice of its decision, because it now invites the profession at large to compete for employment upon the intended new public offices, which are, he says, proposed to be on a scale of expenditure far greater than that of the New

Palace at Westminster, on the understanding that the architect to be employed will be paid the accustomed commission of five per cent. on the outlay.

This, at first sight, is a plausible statement, and if left unexplained may create an impression that the new Government offices, when wholly completed, will cost more than the new Houses of Parliament. It is very easy for Sir C. Barry to hazard a statement with reference to the ultimate cost of the proposed new offices, but he does not show upon what data that statement is based. If he measure the supposed cost of the new offices by the expenditure upon the new Houses of Parliament, he makes a great error. Whatever may be thought desirable with respect to external decoration of the former there can be no need for those costly and elaborate internal finishings which characterise the latter, and which have tended mainly to increase the estimated cost of that edifice from 700,000 *l.*, or thereabouts, to an outlay of nearly 2,000,000 *l.*

It is not intended to embark in any such expenditure as that assumed by Sir C. Barry; all that is now proposed is to erect two public offices, in one of which there is to be an official residence, the precise cost of which will be ascertained before the works are commenced; and if the regulations which now exist in this department are duly observed, the intended buildings will be contracted for in gross, and the amounts reported to the Government, and no excess of expenditure will be permitted without express sanction. If it should be hereafter determined to erect any other buildings than those now immediately contemplated, Parliament must approve of the necessary outlay, and thus a complete control over the expenditure will be secured.

With reference to the proposal to remunerate the architects who may be employed to erect the War Office and the Foreign Office by a commission of five per cent. on the outlay, and which Sir C. Barry compares with his own remuneration of four per cent., I think there is ample justification for such a course in the dissimilarity of the two cases. In the one, namely, the Houses of Parliament, there are, according to Sir C. Barry's statement, 1,180 rooms, 19 halls, 126 staircases, and more than two miles of corridors and passages: facts which of themselves show how great must have been the repetition of the same mode of finishing, and the extent to which one design or one set of details was applicable, although differing in minute particulars. But in the new public offices about to be erected, each differing from the other, and upon which two architects may be employed, the adaptation of the design to the requirements of each department will demand great personal attention from the architect, whilst the expenditure will not be greater than is absolutely necessary for the erection of substantial buildings, with internal finishings of a plain and suitable character, and a total absence of the embellishments suitable for the Palace at Westminster, but wholly unfitted for buildings intended for the current official business of the country, which, whilst they considerably increase the cost of an edifice, add largely to the architect's remuneration, without much additional labour to himself.

On reviewing all the circumstances, I cannot but feel that Sir C. Barry has placed his case upon a wrong issue, in treating it as a commercial question; the Government, consequently, has been obliged to view it in the same light. However inadequate Sir C. Barry may have thought the remuneration offered to him by the Government in 1839, he nevertheless agreed to bow to the decision, and to that agreement he should have adhered.

(signed) *Henry A. Hunt*,
Surveyor of Works and Buildings.

21 April 1857.

From Sir *C. Trevelyan* to Sir *B. Hall.*

Sir,

Treasury Chambers, 30 April 1857.

With reference to your reports of the 27th February last and 24th instant, I am directed by the Lords Commissioners of Her Majesty's Treasury to request that you will inform Sir C. Barry that they have had before them his representation protesting against the decision in respect of his claims; but that as they consider the question of his remuneration to have been finally settled by the minute of this Board of the 4th of July 1856, to which he assented, and under which the payments were subsequently received by him, their Lordships do not consider it necessary to reply to his observations.

I am, at the same time, to state, that my Lords concur in the observations contained in the report of Mr. Hunt, transmitted with your communication of the 24th instant.

I am, &c.

The First Commissioner of Works, &c. (signed) *C. E. Trevelyan.*

From Mr. *Austin* to Sir *C. Barry.*

Sir, Office of Works, &c., 2 May 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c. to state that he has received a Treasury letter, instructing him to inform you that their Lordships have had before them your representation, protesting against the decision in respect of your claims, but that, as they consider the question of your remuneration to have been finally settled by their Lordships' Minute of the 4th July 1856, to which you assented, and under which the payments were subsequently received by you, their Lordships do not consider it necessary to reply to your observations.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin*, Secretary.

From Mr. *Austin* to Sir *C. Barry.*

Sir, Office of Works, &c., 4 May 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c., to acknowledge the receipt of your letter of the 14th ultimo, urging the allowance of a commission to you upon Mr. Thomas' salary, and to inform you that, after a full consideration of the subject, he sees no reason for altering his decision upon the subject.

I am, &c.

(signed) *Alfred Austin*, Secretary.

Sir Charles Barry.

From Sir *C. Barry* to Mr. *Austin.*

Sir, Old Palace Yard, 6 May 1857.

I HAVE to acknowledge the receipt of your letter of the 4th instant, stating that the First Commissioner of Her Majesty's Works, &c., sees no reason to alter his decision, respecting commission upon the sums paid to Mr. Thomas, for the stone carvings of the New Palace at Westminster. I have only, therefore, to state my regret and dissatisfaction at this determination, which I must ever consider to be at variance with the justice of the case.

I avail myself of this opportunity to remind you, that although many payments have been made to contractors for the works at the New Palace at Westminster, upon my certificate, since the 2d February last, no concurrent payments have been made to me as agreed upon, for commission, which in the aggregate amounts to above 1,000 *l.*

I am, &c.

Alfred Austin, Esq. (signed) *Charles Barry.*

From Mr. *Austin* to Sir *Charles Barry*.

Sir, Office of Works, &c., 13 May 1857.

THE First Commissioner of Her Majesty's Works, &c., has had before him your letter of the 6th instant, in which you remind him that although many payments have been made to contractors for the works at the New Palace at Westminster, upon your certificate, since the 2d February last, no concurrent payments have been made to you, as agreed upon, for commission, which in the aggregate amounts to above 1,000 *l.*; and I am directed by him to inform you that it appears that you did not send in your claims for that commission until the following dates, viz.:

March 6th; March 21st; April 9th; May 7th;

and that the same are in course of examination.

If you would send in your accounts for professional services at the time the contractors' certificates are delivered to this office, you would be paid in due course with the tradesmen, and it would be more satisfactory to the Board if you would adopt that system.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin*, Secretary.

From Sir *C. Barry* to Mr. *Austin*.

Sir, Old Palace-yard, 15 May 1857.

IN reply to your letter of the 13th instant, respecting my accounts for commission, I have to acquaint you that, with the exception of those forwarded on the 4th of March, which consisted principally of arrears, all subsequent accounts were forwarded with those of the tradesmen to which they relate; and I will take care to comply with your request that a similar course be adopted in future.

I am, &c.

A. Austin, Esq. (signed) *Charles Barry*.

From Sir *C. Barry* to Mr. *Austin*.

Sir, Old Palace Yard, 22 May 1857.

I HAVE to acknowledge the receipt of a warrant dated the 21st instant, for the payment to me, of 1,029 *l.* 7*s.* 9*d.* on account of commission upon the current expenditure, in respect of the New Palace at Westminster.

As this amount is by arrangement computed exclusively at your office, I should be glad to be favoured on this and all future occasions of similar payments, with a statement of the items to which they refer, in order that I may have the allowances correctly entered in my books.

I am, &c.

A. Austin, Esq. (signed) *Charles Barry*.

From Mr. *Austin* to Sir *C. Barry*.

Sir, Office of Works, &c., 27 May 1857.

I AM directed by the First Commissioner of Her Majesty's Works, &c. to send you the enclosed statement, affording the particulars requested in your letter of the 22d instant, as to the manner in which the payment of 1,029 *l.* 7 *s.* 9 *d.*, made to you in respect of your commission, is made up.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin*,
Secretary.

STATEMENT of the Items on which the Commission of 1,029 *l.* 7 *s.* 9 *d.*, referred to in Sir *C. Barry*'s Letter of 22d May 1857, is calculated.

		£.	s.	d.
3 per cent. and 1 per cent. -	On the account of Thomas Edge, for gas fittings, certified 4th March 1857, 148 *l.* 13 *s.* 4 *d.* - -	5	18	10
3 per cent. -	On the accounts of the following tradesmen, viz:—Chadwick, Foord, Smith, Clarke, Edge, Battable, Easton & Amos, Jeakes, Crace, Deville, Fenn, Hardman, James, Taylor and Jay, as per abstract, certified 5th July, 12th August, and 27th August respectively, and amounting in all to 13,885 *l.* 2 *s.*	416	11	–
1 per cent. - -	Additional on the above, except on 50 *l.*, the amount of Messrs. Taylor's bill, for carving machines, *i. e.* on 13,835 *l.* 2 *s.* - - - - - - -	138	7	–
3 per cent. and 1 per cent. - -	Upon the amount of wood and stone carvers' wages, from the week ending 5th July 1856 to the week ending 31st January 1857, 2,388 *l.* 2 *s.* 5 *d.* -	95	10	5
3 per cent. and 1 per cent. - -	On Jabez James' account, 2,064 *l.* 5 *s.* 6 *d.* (certified 21st March 1857) - - - - - -	82	11	4
3 per cent. and 1 per cent. -	On the accounts of John Jay and J. B. Daines, certified 3d April 1857, and upon wood and stone carvers' wages, from 1st February to 31st March 1857, in all 4,601 *l.* 18 *s.* 7 *d.* - - - - -	184	1	5
3 per cent. and 1 per cent. - -	On the amount of wood and stone carvers' wages for the month ended 30th April 1857, 195 *l.* 10 *s.* 11 *d.* - - - - - - - -	7	16	4
1 per cent. - -	Also, Upon wood and stone carvers' wages, from 28th September 1854 to 26th June 1856, 9,857 *l.* 3 *s.* 5 *d.*, and upon which a commission of 3 per cent. has already been paid, but, by recent arrangement, 1 per cent. additional is now to be allowed - -	98	11	5
	£.	1,029	7	9

27 May 1857. (signed) *Joseph Bedder.*

Office of Works, &c.,
16 June 1857.

B. HALL,
First Commissioner of Her Majesty's Works
and Public Buildings.

WESTMINSTER NEW PALACE.

COPIES of all further CORRESPONDENCE between the Treasury and Sir *Charles Barry*, and between the First Commissioner of the Board of Works and Sir *Charles Barry*, respecting his REMUNERATION as ARCHITECT of the NEW PALACE at WESTMINSTER, up to the present time.

(*Mr. Drummond.*)

Ordered, by The House of Commons, *to be Printed,*
17 *June* 1857.

108—Sess. 2.

Under 8 *oz.*

CLOCK TOWER (NEW HOUSES OF PARLIAMENT).

RETURN to an Order of the Honourable The House of Commons,
dated 6 July 1857;—*for*,

RETURNS "of the Amount in Weight of Gold Leaf used in decorating the Outside of the Clock Tower of the New Houses of Parliament up to the 30th day of June 1857:"

"Of the Cost of the same; distinguishing the Cost of the Gold Leaf from the Amount paid as Wages to the Artificers employed thereon up to the same Date:"

"And, Estimate of the entire further Sum which will be required for the Completion of the Work."

Sir, Office of Works, &c., 7 July 1857.

I am directed by the First Commissioner of Her Majesty's Works, &c., to send you herewith copy of an Order which was made last night by the House of Commons for Returns respecting the Clock Tower at the New Palace at Westminster; and I am to request that you will, with as little delay as possible, furnish the First Commissioner with the necessary information to enable him to make these Returns.

I am, &c.

Sir C. Barry. (signed) *Alfred Austin*, Secretary.

Sir, Old Palace Yard, 25 July 1857.

I have to acknowledge the receipt of your second letter of yesterday's date, respecting the information required relative to the gilding of the clock tower roof of the New Palace at Westminster; and I have to inform you that, in consequence of the unusual nature of the requirement, I have had some difficulty in obtaining the requisite data from the contractors employed.

I now forward to you, however, the following particulars, as requested, to enable the First Commissioner of Her Majesty's Works, &c., to make the return required by the Order of the House of Commons, transmitted to me with your letter of the 7th instant:

1. That "the amount in weight of gold leaf used in decorating the outside of the clock tower of the New Houses of Parliament, up to the 30th day of June 1857," is about 95½ ounces.
2. That "the cost of the same, distinguishing the cost of the gold leaf from the amount paid in wages to the artificers employed thereon up to the same date," is 1,119*l.* 17*s.* 6*d.*; of which, 890*l.* 6*s.* 3*d.* applies to the gold leaf used, and the remainder, 229*l.* 11*s.* 3*d.*, relates to the wages paid to the artificers employed. And,
3. The amount of my "estimate of the entire further sum which will be required for the completion of the work" in question, is 414*l.* 8*s.* 6*d.*

For the further information of the First Commissioner, I think it right to state that, for the sake of durability, I have deemed it advisable to make use of fine or pure gold of treble the thickness of ordinary gold leaf; and also that difficulties have arisen owing to the galvanic action between the gold and the metals in contact with it, which have rendered it necessary to regild a portion of the

213—Sess. 2.

work, by which the cost has been unfortunately, but unavoidably increased. A composition has, however, been applied, which, in addition to many advantages both as to durability and colour, &c., constitutes a perfect insulation between the gold and the metals which it covers. I have therefore the utmost confidence in believing that the gilding, as now executed, will remain unimpaired and unaffected in appearance for a very considerable number of years to come.

I am, &c.
(signed) *Charles Barry.*

Alfred Austin, Esq.

B. Hall,
First Commissioner of Her Majesty's
Works and Public Buildings.

Office of Works, &c.,
27 July 1857.

CLOCK TOWER
(NEW HOUSES OF PARLIAMENT).

RETURNS of the Amount in Weight of Gold Leaf used in decorating the Outside of the Clock Tower of the New Houses of Parliament up to the 30th June 1857; Of the Cost of the same; And, Estimate of the entire further Sum which will be required for the Completion of the Work.

(*Mr. Ridley.*)

Ordered, by The House of Commons, *to be Printed,*
28 *July* 1857.

213—Sess. 2.

WARMING AND VENTILATION OF DWELLINGS.

RETURN to an Order of the Honourable The House of Commons,
dated 21 August 1857;—*for*,

COPY "of REPORT to the General Board of Health by the Commissioners appointed to inquire into the WARMING and VENTILATION of DWELLINGS."

(*Mr. Cowper.*)

Ordered, by The House of Commons, *to be Printed,*
25 *August* 1857.

320—Sess. 2.

REPORT of the COMMISSIONERS appointed to inquire into the best Modes of WARMING and VENTILATING the APARTMENTS of DWELLING-HOUSES and BARRACKS.

Sir,

IN the month of May 1856, we, the undersigned, were appointed a Commission to inquire into the best practical methods of warming and ventilating dwelling-houses, and to endeavour to ascertain such principles, and establish such rules as lead to a better and more efficient system in the consumption of fuel, and maintenance of the air of apartments in a genial and healthy condition. Such methods and rules should apply to the rooms of every description of dwelling-houses; and it appeared to us that this inquiry should not exclusively depend upon prevalent theories, but, on the contrary, it should be based upon actual experiments, calculated to determine the principles which should guide us in maintaining an equable temperature, united to a healthy system of ventilation.

Impressed with these views, we have instituted and carried out a series of experiments, and have personally examined the effects produced upon the air in the rooms of buildings, both as regards their chemical and physical relations.

Regarding the importance of the inquiry, we considered it necessary to call before us such persons as we believed most competent from their experience and knowledge to afford us correct information; but after a lengthened examination, we found the evidence thus accumulated so exceedingly conflicting and contradictory, as to cause us to abandon this mode of procedure, and trust exclusively to experimental facts for the solution of a question of so important a character, and bearing so intimately on the health and comfort of the community. Our inquiries and inspections amongst the different patentees and constructors of stoves and fire-grates were nevertheless valuable, and considerable information was elicited, as, although on many theoretical points they were diametrically opposed, they all aimed at obtaining the same results, namely, the economy of fuel in the heating of rooms combined with sufficient ventilation.

Finding the information obtained by the examination of witnesses far from conclusive, we deemed it necessary, in order to arrive at satisfactory results, to determine the question by a carefully conducted set of experiments, to be commenced and carried through by ourselves.

In November 1856, Sir John Burgoyne, the inspector-general of fortifications, desired that barracks should be included in our inquiries, stating that the ventilation of barracks was very imperfect, not from any fault in their construction, but from the number of men congregated and sleeping within necessarily limited spaces.

The inspector-general not only called attention to the above, but to the possibility of obtaining a sufficient and wholesome renewal of air, combined with the greatest possible economy of space, so that for the convenience of the men and the service the greatest surface of floor might be obtained for the accommodation of the troops, at the same time that the height of the rooms might be reduced, as much as would be consistent with a proper degree of ventilation; and this, he stated, remained to be performed, the science or art of ventilation never having been reduced to system.

In order to arrive at satisfactory results, with respect to these, and the first mentioned objects, six distinct series of experiments were instituted:—

I. Experiments in the board-room of the General Board of Health, on the temperature of the air, the walls and the floor, and the hygrometrical states of the air (Appendix A).

II. Experiments at the Wellington Barracks in different soldiers' rooms, on the temperature of the air, the temperature of the walls and floor, and the hygrometrical states of the air, as heated by different open fire-grates.

III. Experiments to determine the effects of duplicate panes of glass.

IV. Experiments at the Wellington Barracks to determine the physical relations of ventilation.

V. Experiments at the Wellington Barracks, to determine the chemical relations of ventilation, by H. E. Roscoe, Esq.

VI. Experiments in the board-room of the General Board of Health, to determine the direction and force of currents in the air, instituted by J. F. Campbell, Esq.

In January 1857, the Lord President of the Council of Education wished us to extend our inquiries to schools; but we considered it desirable to complete the one report we were then engaged upon; at the same time, we expressed our willingness to engage in such inquiries at a future time, should it be the wish of Her Majesty's Government that we should do so.

REPORT, No. 1.

The first step taken in regard to the objects of the Commission was, the collection of all the patents bearing upon warming and ventilation, which were applicable to dwelling-houses. These were studied, and a careful abstract made of each specification, a complete list of which appears in the Appendix. These abstracts were carefully analysed and collected into groups, according to the different principles involved, the precise mode of construction adopted, and the various mechanical appliances made use of to assist minor details of action. The second step was the collecting all information possible from manufacturing practical men, and individuals who owned manufactories, upon the defects and advantages of the fire-grates they employed.

The third step was the carrying on a series of experiments at the Board of Health, and at the Wellington Barracks, upon the temperature of the air of the rooms at different distances from the floor, the temperature of the walls, and of the floor itself, together with the humidity of the air, as heated by different stoves. These experiments will be found in the Appendix. The complete detail of these experiments are too bulky for publication; they are preserved at the Board of Health, and our Report upon warming rooms is based upon these two series conjointly.

The patents examined in regard to fire-grates extend from the year 1781 to the year 1857, and include all that could be collected for the purposes of the Commission. These have been carefully examined, not only with reference to the different principles involved, which have been grouped and classified, as shown in Appendix, but with reference to their respective details of construction. Many of the patents were found, as might well be supposed, to contain no intrinsic novelty of principle or design; yet this very want of novelty, compelling a difference in the mode of construction, or the overlaying similar constructions with additional appliances, is not without a degree of benefit to the inquiry, and none have been omitted in the discussion on the ground of want of originality.

A large number of the fire-grates examined, especially those dating from about the year 1822, are constructed with the view of warming and ventilating conjointly. These form a separate division in the analysis of inventions; but few among them can be considered to have succeeded in the endeavour, the greater number effecting only a circulation of the air of the lower part of the apartment to a little above the chimney breast. This method of low ventilation is to be avoided on various grounds, of which it may be sufficient here to remark, that it is conducive to the formation of currents of air, or draughts, within the level of the occupants of the apartment, which is at all times productive of great discomfort; that it weakens the chimney draught by the admixture of colder air, and is thus conducive to smoky chimneys; and that ventilation proceeds only in part, from that portion of the room where the air is purest and least requires to be changed.

The fire-grate, in its earliest form of construction, was looked upon, it must be remembered, as a contrivance simply to warm the room; and for a long time every improvement had reference to the increase of its power of affording heat, and effecting a more perfect and economical combustion of fuel. As early as the year 1791, an effort was made to effect the consumption of smoke, on the ground of economy and convenience, an effort since variously repeated, and forming the base of a large number of inventions constituting, together, a separate and important division of the present inquiry.

In order to the better understanding of the following analysis, it will be necessary briefly to explain the laws on which combustion mainly depends, and to state a few facts relative to the generation and diffusion of heat.

The escape of heat through space is called the radiation of heat, and its communication from one body to another is called conduction of heat. The latter process, as applied to the warming of rooms, is slow compared with the action of the former.

The open fire-grate for the consumption of coal is intended to warm rooms by the radiation of heat from the ignited and incandescent fuel.

All bodies radiate heat in proportion to their excess above that of the medium in which they are placed, and according to the nature of the radiating body. The radiation is greatest from rough and dark surfaces, and least from surfaces of polished metal.

The rays of radiant heat pass freely through the air without affecting its temperature; when they impinge upon bodies, they are reflected, absorbed, or transmitted. They are reflected when they fall upon a polished surface; they are absorbed when they fall upon bodies which receive them, and which become heated in consequence, as the furniture and walls of a room; and they are transmitted by contact or communication with the furniture and walls, the colder air borrowing heat from them, and parting with it to surfaces of lower temperature, with which it comes in contact.

The heat generated in the fireplace depends on the union of the combustible part of the fuel with a due supply of oxygen. From this union results the generation of heat and the products of combustion, the principal of which, from coal, are carbonic acid, steam and nitrogen, all invisible, and which make their escape up the chimney shaft unseen; the incombustible matter contained in the coal forms the refuse ash. If the combustion be imperfect, large quantities of carbon in the shape of soot and smoke are formed, and there is loss of heat in consequence.

Air expands by heat; 1,000 measures of dry air at 32°, when heated to 212°, increase in volume to 1,366·5 measures; so that 1,000 cubic feet of air at 32°, become 1,366·5 cubic feet at 212°.

Air, therefore expands $\frac{1}{491\cdot13}$ part of its bulk for every increase of 1° of heat; so that

		Deg.	
The bulk of 100,000 parts of air - -	at	32	is 100,000
„ „ „ increases	at	40	to 101,629
„ „ „ „	at	50	to 103,665
„ „ „ „	at	60	to 105,701
„ „ „ „	at	70	to 107,737

Air, when heated, is thus specifically lighter:—

	Deg.		
At the temperature of	30,	a cubic foot weighs	569·2 grains
„ „	40,	„ „	557·8 „
„ „	50,	„ „	546·8 „
„ „	60,	„ „	536·3 „
„ „	70,	„ „	526·2 „

under the same atmospheric pressure; viz., 30 inches of mercury. Therefore, a cubic foot of air at 40° is 11·4 grains less in weight than at 30°; and this difference of weight for each successive 10° becomes less, till between 60° and 70° it is 10·1 grain.

The ventilation of rooms and buildings depends in a great measure upon the ascending and descending currents of air caused by differences of temperature, the warmer air ascending, and the colder or heavier descending; the greater the difference of temperature the greater being the difference of weight, and the rapidity of interchange. In like manner air will become heavier or lighter on coming in contact with chilled or warm surfaces, and will fall or rise accordingly.

Warmth and comfort, with regard to domestic homes, have long been terms almost synonymous; yet the throwing open doors and windows in the most unseasonable weather, and at the most inconvenient times has equally long been submitted to, as an inevitable necessity attendant upon the salutary supply of pure fresh air. This crude method of ventilation, we are all aware, rapidly brings down the temperature of the room, and diminishes our comfort, besides forcing upon the fire the additional necessity of heating a mass of air very little removed in temperature from that of the external air. Moreover, with the closing of the doors and windows the act of ventilation ceases, which is the more injurious, the ill effects of the want of its continuance being unceasing and accumulative, as any one may prove for himself by entering an apartment occupied on the previous evening, with no other subsequent ventilation than that afforded by an ordinary fire-place, the door of the room having been closed during the night. The personal discomfort he will experience and the annoyance to his sense of smell will warn him to retire till the windows and doors have been thrown open for the admission of fresh air. If he return to his bedroom, he will experience the same inconvenience, and instinctively adopt the same remedy; but this does not rectify the insidious and ill effects of the continuous action of the vitiated air upon the inmates of such apartments; nor can the admitting large masses of untempered air to the interior of our dwellings, laden with the fogs and impurities of a metropolitan atmosphere and its environs, be otherwise than injurious.

Hence is made evident the necessity of a method of ventilation which shall be as continuous and imperceptible in its action as that which is created by the occupants of an apartment upon the air which it contains, and which shall carry off all impurities, which are the more injurious because invisible and accumulative, and subtle in their action upon the health of living beings subjected to their influence.

The action of ventilation is simply the withdrawal of the spent air of an apartment and its replacement by pure air. The effecting this, with the required degree of warmth, at moderate cost, is a difficulty to the successful overcoming of which we have but few approximations. To remove this difficulty, if possible, is one of the main objects of the present Commission.

In the air of an ordinary room, apart from every other cause, the main source of its impurity arises from the continuous exhalations given off from the lungs of its occupants, which, when expired, should be, as in the open air, permitted to pass away without the possibility of again entering the lungs. To be convinced of the necessity of a continual supply of fresh air, we have only to remember that by the act of breathing we remove from it the principle by which life is supported. A constant renewal of the air, therefore, to the amount requisite to keep that sufficiently pure which is inhaled, is absolutely necessary.

While the air is in the lungs it acquires so much heat that it becomes specifically lighter than the surrounding air, and rises above our heads during the intervals between inhaling and exhaling. Out of doors this passes away and mixes with the atmosphere beyond a possibility of return. Within doors it ascends to the upper part of the apartment, where it remains until displaced by other and continuously ascending currents, when it descends and is again inhaled.

But the air is rendered not only impure by breathing, it is also rendered impure by vapour and disengaged gases passing through it, and given off from various sources, such as candles, lamps, the effluvia of dinners, &c. Each room, therefore, should be provided with an outlet for the bad air, and maintained in constant operation.

In regard to our domestic homes, ventilation is scarcely second in importance to a due degree of warmth, and the want of it will be felt more and more in proportion as our habits of life seclude us within the precincts of close and well-built habitations, the effect of which is to neutralise those natural processes by which we obtain our supply of pure atmospheric air, without which health cannot be permanently supported.

The importance of ventilation has for some time past been largely acknowledged by the medical world, and the ill effects arising from its neglect have been strikingly exhibited in various published medical works, bearing on the subjects of health and disease; but although it is not difficult to perceive its effects in extreme cases, and in seasons of epidemics, it is difficult to realise to the full extent the injury arising from its neglect in the houses of competence and ease. It is less difficult, however, to understand, that the more complete we make the appliances of our rooms, and the more we administer to the warmth-giving power of the fire by carefully fitting doors and windows, the more we deprive ourselves of extraneous aid in support of the necessary change of air.

In every view of the subject, therefore, we are presented with the questions: How much air is required to maintain the purity of an apartment, in relation to its size and ordinary amount of occupation? How is the supply to be obtained? and, How is the bad air to be withdrawn? To these we shall have to refer in the sequel; for the present, having stated the principles on which all systems of warming and ventilation must be based, we next proceed to the consideration of the plans suggested, as shown in the several patents which we have examined. Secondly, in the experiments instituted at the rooms of the General Board of Health and the Wellington Barracks; and lastly, to such deductions and conclusions as we have been enabled to arrive at, to meet the requirements of an improved and more healthy system of heating and ventilating dwellings. The discussion of the patents has been arranged in sections under the following heads:

Section I. Contains the analysis of different plans for the prevention of smoke by feeding from below upwards, and rotary or inverting grates.

Section II. Contains the analysis of plans for prevention of smoke by a downward current.

Section III. Contains the analysis of plans for consuming smoke by means of hot air chambers above.

Section IV. Contains the analysis of plans for preventing smoke in part by deflecting hot air downwards, and by directing cold atmospheric air direct into and through the fire.

Section V. Improvements in the form of registers.

Section VI. Improvements for economising and utilising heat by returning warm air into the apartment.

Section VII. Improvements for economising fuel and heat, by combining reflection from polished surfaces with conduction and radiation.

Section VIII. Fire-grate stoves.

Section IX. Miscellaneous improvements, including facilities for diminishing the dirt and waste of an open fire-place, blowers and screens, facilities for quickly extinguishing fire, and attached fire-guards.

Section X. Stoves in general.

Section I.

Analysis of Plans for the Prevention of Smoke, by feeding from below upwards, and Rotary or Inverting Grates.

Fire-grates which have been specially constructed with the view of preventing smoke are tolerably numerous, and their inventors have chiefly had recourse to the plan of rendering supplies of fuel to the fire, underneath the grate, by some mechanical adjustment. This method of construction is sound in principle and combined with many advantages in practice. In the year 1785 James Watt took out a patent (the earliest with which we are acquainted) for the prevention of smoke in furnaces; in it he specifies that the fire is supplied from above downwards, by a reservoir of fuel above in contact with the ignited mass, the combustion of which is supported by a strong lateral current of atmospheric air, passing direct through the fire into a flue on the other side, aided by a slight downward current through or beside the fuel, which last descends by its own gravity, as the fire consumes. For the purpose of intercepting and completing the destruction of the products arising from imperfect combustion, if any, a clear and separate fire is maintained near the entrance into the flues, so that the products from the first fire being subjected to the intense heat of the second, and mingled with atmospheric air, may be most effectually consumed. These principles have been variously applied by patentees; but the first and soundest part of the specification has been chiefly adopted by the inventors of fire-grates belonging to this section.

The first of these inventions was originated by Mr. Cutler, in 1815 (patent, No. 3873), who constructed a grate, so that the fire should occupy a position intermediate between the fresh fuel and the chimney flue, that the products of the former should pass through the fire on their way to the latter; with this difference, in regard to the domestic application, that the vertical position of the flue above the fire necessitated the placing of the fuel underneath, in order to preserve the same relative arrangement as that adopted by Watt in his specification.

Besides differing but little in form from those generally adopted, this fire-grate of Cutler's promised to include the collateral advantages of being cleanly in its operation, and economical. The raising of the bottom of the coal-box, however, for a fresh supply, and the maintaining it in its position, involved an apparatus of chains and pullies at the back, cumbersome at least, if not liable to derangement, and was a drawback upon the employment of this otherwise efficient contrivance.

In 1816 (patent, No. 3975) another attempt of similar character was made, and a patent was taken out for placing the coal-box at the back of the fire-place, so that the coals were wound forward through the back of the grate into the fire; the inventor relied upon the smoke being in great part prevented by the horizontal supply, and the remainder being carried away by a vertical opening situated in the register over the coal-box, by which to afford an increased draught at the time of every fresh supply.

In the same year a patent (No. 4001) was taken out for a feeding shovel, constructed for the purpose of introducing fuel into the under part of the fire, by thrusting the shovel into it just above the bottom grating. The contents of the shovel are dislodged by means of a piston, worked by a rod in the handle of the shovel. This plan might be made generally available for supplying coals to an ordinary grate, by rendering the lower bar moveable, so as to allow sufficient space in front for the passage of the shovel.

In 1825 another patent (No. 5190) was taken out for the supply of coals from the back of the grate into the fire. In this case the bottom of the fuel chamber was made to slope at a sharp angle towards an opening in the back of the grate, so that when the fuel chamber was supplied from above, the coal descended by its own gravity down the incline into the fire.

The next patent in reference to Cutler's construction appears in the year 1846; but in the interim, between this date and 1816, Dr. Arnott had adopted the same principle, and constructed the grate, now so well known as Arnott's smokeless fire-place. Although not patented, it has formed the base of a number of patents, varied from the original construction in exterior design and working details, and we therefore proceed to its description.

As in Cutler's, the fuel-box is placed immediately beneath the fire-grate; but the adjustments for raising the fuel are more simple, it being borne upwards when required on a moveable bottom or piston, the poker being applied as a lever for raising it. The aperture of the chimney above, is contracted by a metallic hood, somewhat in the shape of an inverted funnel; but whenever possible, the contraction is made in the brick-work setting of the stove. If the former be employed it should be lined with tile to prevent any smell arising from over-heated metal. Within the aperture of the contracted throat is a valve or damper, its handle or index rendered very conspicuous, and the degrees of opening marked on its plate, as clearly as points are marked on a compass card. By opening and closing the valve, the draft may be increased or diminished, and the rate of combustion accelerated or retarded.

A movable plate or blower in front, is made to regulate the size of the front opening over the fire-place, and is used in conjunction with the valve to secure the requisite degree of combustion.

A channel communicating with the external air is introduced under the hearth, to diffuse into the room and about the fire a supply of air, which becomes tempered in passing under the fender, and in its previous passage through the air channel.

The patent taken out in 1846, No. 11,035, and founded upon Cutler's and Arnott's construction, supplies fuel from below, which is raised into the fire by means of the poker used as a lever. The mechanical construction of this stove differs from others in its arrangements for re-filling the coal-box, the fire-grate being made to slide back into a recess to admit of a fresh supply into the mouth of the coal-box.

In 1854, patent No. 1,168, the same base of construction, laid the foundation of a fresh patent, differing from Arnott's construction, inasmuch as the incandescent mass is brought down upon the fuel below when a fresh supply is needed, instead of the fuel being advanced upwards, the front bars of the grate and face of the fuel-box being made to slide together in a frame, and to descend according to the wants of combustion; by this arrangement, the fire-grate, which may be of average height in the morning, becomes a low fire by the evening, or when the supply within the fuel-box is nearly exhausted.

In the same year was patented, No. 1,323, another method for effecting the same object, the coals being forced in small supplies into the lower part of the fire through a fuel-pipe serving as a passage of communication between the bottom grating of the fire-place and a side chamber or receptacle for the coals, the poker being used as a handle or lever for introducing the fresh supply.

In 1854 were likewise patented two other modes of construction for the prevention of smoke; the one, No. 2,612, having a direct bearing on Watt's method, of mingling the products of the one fire with atmospheric air, and directing them through an intensely heated mass: this, the inventor has accomplished by means of two grates placed one above another, the fire within the upper and supplemental grate being of coke or anthracite, or any non-bituminous fuel, and the fire in the lower grate of coal; the products of this last, pass through the clear bright fire above, that imperfect combustion may thus be rendered perfect. In patent, No. 663, the fire-grate is surrounded at the sides and back with a fuel-chamber, the fuel being drawn forward by the poker as required; the fire itself is bright and clear, from the coal undergoing a process of distillation previous to its application, the coal of to-day becoming the coke of to-morrow.

In 1856, Cutler's and Arnott's stove again formed the base of another patent, No. 335, differing but slightly in construction from others of the kind; the coal-box is raised by means of the poker, applied as a lever through holes made in front of the coal-box for the admission of air to the fuel within. In regard to permitting the admission of air to the fuel, this mode of construction differs from all others.

The same year likewise supplied two elegant and very ornamental modifications of Arnott's fire-grate, the one, patent No. 173, introducing the use of a double circular register, the other, patent No. 106, constructed chiefly with reference to the obtaining heat by the radiation from and conduction of metal surfaces, and claiming the invention of double grates introduced between the fire and the fuel-box below, for the purpose of maintaining a more equal degree of combustion by an under current of air. This plan necessitates the drawing out of the double grating, when it is desirable to wind up the fresh fuel, in contact with the fire, and also the providing a similar double grate between each successive supply, to be similarly drawn out and deposited in a drawer underneath the fire-place until again required.

Here closes the list of this division of fire-grates. From among them the Commissioners selected for trial, No. 1,168, in 1854; this is Mr. Jeake's modification of Arnott's construction, and was tried, with two other modifications of Arnott's stove, made respectively by Messrs. Edwards & Bailey.

Rotatory Smoke-consuming Grates, 1818 to 1855.

A class of fire-grates following the same principle of supply from underneath, but of totally different construction, next claims our attention, and may be distinguished as cylindrical or rotatory grates. The first of these appears in 1818, No. 4,316, the grate being made to turn upon its axis, so that on fresh fuel being applied the grate may be inverted, and the smoke from the fresh fuel obliged to pass through the fire and be there consumed. In 1825, No. 5,257, the fire-grate is cylindrical, and revolves on a hollow axis. It is divided by open gratings longitudinally from end to end, into three equal compartments, to each of which access is gained by means of a door, or moveable bars. The fire is lighted in one of these compartments, and fuel is supplied into the remaining two; when the fire has burnt clear, the cylinder is turned, so that the coal immediately beneath and contiguous to the fire compartment becomes ignited, and is compelled to pass through the burning portion and be there destroyed.

The next invention of the kind is in 1854, the grate consisting of a cylinder of bars turning on an axis, and divided into compartments by inner gratings, extending from end to end. In one of the compartments the fire is lighted, and into the other fresh fuel is supplied. The grate is turned when necessary, so that the burning fuel and fresh coal are brought into contact, the products of the latter being directed through the former for the purpose of being consumed.

Both this, and the preceding grate, the date of which is 29 years earlier, may be considered identical in principle and action. The original is supported on standards; the latter is fixed between the cheeks of the fire-place.

In 1854, No. 1,617, there is mention again of a cylindrical fire-grate, centered upon an axis, which is carried into the sides of the fire-place by suitable bearings, capable of communicating either a horizontal or vertical motion to the cylinder, as required; the grate may be turned so as to radiate its heat into the room, and fresh fuel is introduced by removing some of the bars. In the same year, No. 1,221, mention is again made of a cylindrical fire-grate capable of inversion or rotation after each supply of fuel, to effect the combustion of the smoke; both these plans received provisional registration only.

In 1855, No. 646, is another cylindrical fire-grate, divided into two compartments by a longitudinal dividing plate, in connexion with two circular plates turning on an axis withinside the two end plates of the cylinder. The fuel is thrown into the cylinder at the back part of the dividing plate, on opening a lid, which is kept close at other times, to prevent the products of combustion passing off in that direction. The inner frame is turned so that the fresh fuel may be driven under that which is in a state of ignition.

Although good in principle, the form of these rotatory grates differs from the ordinary fire-grate sufficiently to create a prejudice against their general adoption. None of these grates were tried by the Commission, but they evidently combine in their construction the essentials of cleanliness and simplicity of action. On the other hand, much heat is lost which might be obtained by conduction, the grate being in a measure isolated, and turning on an axis by means of a lever or small winch between the cheeks of the fire-place. The fire likewise being enclosed all round, in a kind of cage, or skeleton cylinder, is opposed to the general prejudice in favour of open fire-grates. This construction however solves the great practical difficulty in regard to the supply of fresh fuel in such manner that the products of imperfect combustion shall pass through the fire, and be there destroyed; the method employed being one of simple and easy adoption.

SECTION II.

Prevention of Smoke by a downward Current.

Of smoke consuming but not self feeding fire-grates, the following may be classed together:—

In 1791, that is six years from the date of Watt's specification, a patent, No. 1,798, was taken out for a fire-grate "for increasing the action of air upon fire, by augmenting and inverting its passage through the same, whereby is combined in an extreme degree the nitre of atmospheric air with the sulphur of fuel; for it is understood that nitre and sulphur produce the strongest fire known, and that when the invention is applied so that no air shall pass but through the fire, the strength thereof is augmented, so that it shows a perfect white heat, and as the draught is necessarily very great, all or nearly all of the ignited smoke is carried down into the fire, and there consumed, instead of passing off, as it must do in a common way; thus (still to quote the words of the patentee) "I convert the smoke into fire, and am also enabled to produce a fine clear fire from such refuse fuel as other open fire-grates will burn with difficulty only."

It is thus evident that smoke was considered in the light of a combustible to be burned, and that the method of its combustion was based upon the specification of Watt before alluded to. By supplying a current of air through the fire, the intensity of which would be greatly promoted, it gave promise of preventing in part at least, the formation of smoke. The main difficulty as regarded its entire prevention, must have consisted in obtaining the due supply of atmospheric air, in quantities equivalent to the amount of gas generated in the fire, a difficulty not inconsiderable when the coals are supplied as ordinarily put on, by hand from time to time, and in irregular quantities.

From the patentee's description, the fire-place would seem to have been enclosed, so that flues were formed, one on each side of the fire-grate, with apertures opening into them, one on either side, from under the grate, about three inches above the hearth, the ash-pit being closed with a sliding plate, and the top of the stove covered in with an ordinary register. The air for combustion was therefore supplied over the fire, was directed down through the fire, through the apertures beneath, and into the side flues. A sliding adjustment of the plate closing in the ash-pit, a means of raising or closing the door of the register above; and regulators for the admission of air into the side flues, were the means provided, by their employment either singly or in conjunction, for regulating or sustaining any intensity of combustion, and maintaining it at that point necessary to secure the continuous ignition of the gases evolved, and the consequent prevention of smoke.

This idea, as carried out in 1791, would seem to have laid dormant till the years 1855 and 1856, when the same result was attempted by a better and more concealed mode of arrangement.

The first of these, in 1855, No. 670, is constructed with a flue extending up from the back of the grate into the chimney, there being a grating or apertures of communication into it from the back of the grate. In this flue there is a vertical register which forms the back of the fire-place, and turns on a hinge, the chimney above being closed with a register in the ordinary way. When the register of the flue is thrown back, the draft passes upwards direct into the chimney. When the register is vertical, and the flue consequently open, the draft passes downward through the fire, through the back of the grate, and into the flue behind.

In 1856, No. 924, this construction is but little varied, and is essentially the same in principle, but substitutes an open arch over the fire-grate, and one vertical opening or door for the two registers. This door or register is thrown back for the passage of a direct current upwards when the fire is first lighted, and is afterwards closed, or nearly so. The current is then downwards, through the fire, through the apertures at the back, and so into the flue behind. The flue in this construction is open at its base, and closed more or less for the regulation of the draft, by a sliding horizontal plate.

It is much to be regretted that the Commissioners had no opportunity of trying fire-grates of the above construction, which, sound in principle and promising to combine the advantages of an almost smokeless fire, are supplied with coals in the usual way, and have the appearance of an ordinary open fire-grate. In spite of the disadvantages attendant upon the usual method of hand supply, and the trouble of stirring, watchfulness, &c., it will be some time before the prejudice in favour of the ordinary domestic fire-place will give way entirely for the general adoption of any other mode of construction, however sound in principle, and convenient in action. To many, therefore, a fire-grate on the old system, smokeless or nearly so, would supply a desideratum.

Section III.

Fire Grates for consuming Smoke by Means of Hot-Air Chambers above.

Belonging to this division of fire-grates is one in 1849, No. 12,634, constructed with a triangular metal hood or chamber, projecting from the back to the front over the fire-grate. The three sides of the chamber are formed by a metal blower in front, an inclined and fixed register underneath, and the top casing of the fire-place above. The smoke ascending from the fire passes through perforations in the under plate into the triangular chamber, which is designed to effect its combustion. This stove combines other and supplementary constructive details which do not properly belong to this division.

In 1854, No. 297, the same idea was rather differently carried out by a fire-grate constructed with a triangular chamber above, but so arranged that the vertical side of the triangle was formed by the back of the fire-place, and the other two sides by registers placed, the one inclining downwards, the other inclining upwards; the smoke, &c. passing through apertures into the chamber, and the residue, if any, passing from thence out into the chimney flue.

These arrangements can scarcely be considered satisfactory, inasmuch as it is more desirable to produce a perfect state of combustion, from which no waste products are evolved, than that which permits the waste in the first instance, and seeks to dissipate its effects by an after process. It may be urged that the heat generated in the smoke consuming chamber may be made available for bringing warm air into the apartment or elsewhere as desired; but the soundest principle is that which aims at producing a state of combustion so perfect, that the gaseous products ignite successively as they are generated, and thus cause the fire to give out the maximum intensity of heat that can be obtained.

Section IV.

Fire Grates for preventing Smoke, in part by deflecting Hot Air downwards, and by directing Cold Air into, and through the Fire.

There are two recent constructions of fire-grates which come properly under this head, both of them for promoting increased combustion by arrangements which do not entirely suppress, but which tend greatly to diminish the ordinary amount of smoke. The action of both these grates received trial by the Commission.

That by Mr. Stevens, patented in 1853, No. 1,215, is constructed with a deflecting plate placed at the back of the grate and shelving down towards the fire, for the purpose of deflecting over it a current of warm air, supplied through side flues and passages underneath and about the grate. The air so heated is distributed over the fire downwards, to assist the combustion of the gases arising from the fuel.

That by Mr. Leslie, which is situated very near the floor, and is supplied with oxygen, communicates directly from the external air by two pipes, an inch in diameter, situated on either side of the fire-grate, in front. This construction received trial by the Commission.

The former of these inventions is based on the method of diminishing or suppressing smoke, by the distribution of hot air in a downward stream over the burning surface of the fuel. The latter, by driving a current of pure atmospheric air derived from some external source direct through and into the fire. In principle, we consider that the latter is the soundest.

Section V.

Improvements in the Form of Registers.

A large class of inventions directed to the improvement of combustion in open fire-grates has reference to some novelty in the form or construction of the register, which, either singly or in connexion with other pre-supposed advantages of construction, has been made the subject of a large number of patents; this is not surprising, as the register constitutes one of the most essential features in the arrangements of a fire-grate, tending as it does to the retention of a body of heated air within the apartment, which would otherwise ascend freely and without hindrance into the chimney; if properly constructed, it establishes a power of regulation over the upward draft; of regulation it should be understood in the sense of diminishing from the maximum draft provided, to the minimum required, to support combustion at any point, of intensity. The register is of the highest importance in regard to the economization of fuel, and acts as a screen between the internal temperature of the room and that of the chimney, and is a primary adjunct in nearly all arrangements for the economization of heated air above the fire, retained for distribution into the apartment or elsewhere. From the date of its introduction by Count Rumford, it has received an almost continuous degree of attention addressed to the eliciting that form of construction and size of aperture best adapted to the establishment of a power of control over the ascent of the heated air and products of the fire-grate. It has an important bearing likewise upon the present inquiry, inasmuch as the more effectually it can be made to operate in promoting the economization of heat and fuel, the more does the important duty of ventilation devolve upon other and independent means.

The earliest on the list of these inventions is in 1795, No. 2,056, the register-plate of which is either flat or circular, and perforated or divided into open flutes; these are closed, more or less, by a metal plate made to slide before the apertures, according to the degree of combustion to be maintained; the back of the grate is provided with similar flutings, through which air is admitted into the body of the fire, from a valve concealed in the fittings of the stove; and an upward draft is likewise obtained through a closed ash-pit into the fire.

In 1804, No. 2,795, the chimney-opening was closed by two register-plates arranged so as to form a kind of pointed roof. The edges of the two plates, however, were not quite in contact, that a passage might be provided for the products of the fire to pass through on their way to the chimney.

In 1813, No. 3,763, the opening into the chimney was completely filled by a close fitting but moveable cover, allowing only the passage through of an exit pipe, leading out of the back of the grate, down and around the fire, and from thence into the chimney, into which it constituted the sole channel of ingress.

In 1853, No. 13,312, the register-plate was inclined, contrary to the usual method, from the front to the back of the chimney, that its action might be increased by inner cheeks to the fire-place, to be drawn forward from the sides, for an increased draft.

In 1854, No. 2,622, a funnel or conical-shaped tube was led out of a closed register-plate into the chimney; a valve was placed within the neck of the funnel for regulating the passage of the air upwards into the flue.

In 1855, No. 168, is mentioned a register-plate extending from the back to the front, fitted to the fire-place, with an opening in the plate, supported by rack-work at any desired elevation.

The above relate to patents (of which more might be adduced) taken out specially with reference to this one detail of construction. Its consideration enters largely, however, into all arrangements for the economization of fuel and heat in open fire-grates. Those forms of construction by Williamson and Marsh, in 1855 and 1856, for the prevention of smoke, make, as will be remembered, the register in conjunction with a flue behind, a primary agent by which to effect this purpose. In fact, it may be said to constitute a very important adjunct in regard to the successful operation of every form of construction that has passed or has yet to pass under review.

SECTION VI.

For economising and utilising Heat, by returning Warm Air into the Apartment.

The next division of fire-grates is that by which the heat prevented from escaping up the chimney by the use of the register, is increased in amount and utilised for distribution by hot-air chambers and circuitous flues. This is an important division, as it comprises various attempts to increase the ventilating power of the ordinary grate; we can but hope, however, for an approximate success in this endeavour to make the domestic fire perform two separate functions, one only of which it is fitted to perform efficiently. The warming and ventilation of an apartment we are convinced must ultimately be performed by two distinct operations.

The first on this list is dated 1822, No. 4,744, the fireplace being set so as to leave an aperture of a few inches between the back of the grate and the brick-work setting; the top of this aperture or chamber opens by a valve above, into a flue at the back: a communication is established between the register and the flue by a valve in the former; the object of the construction is to cause any downward gust, &c., which would otherwise drive the smoke into the room, to be carried into the chamber at the back of the grate, which the patentee terms "a rarefying box."

In 1831, No. 6108, the grate is made to project into the room, and above it, is placed an overhanging dome or canopy, through the open work of which the heated air is distributed into the apartment, the smoke, &c. being passed away into the chimney through an aperture beneath the dome. An apparatus of chains and pullies gives a power of raising or lowering the grate under the canopy to regulate the speed of combustion. This method of increasing or diminishing the intensity of the draught was originated (or we may say patented) in 1810, No. 3,313, in which the fire-grate is specified to be rendered moveable upwards and downwards to the height required, to ensure it from smoking into the room, and to give facility for burning wood, if need be, on a level with the hearth.

In 1838, No. 7,603. The fire-place is set forward in the room, so that its back is situated several inches from the wall, and is provided with a somewhat complex arrangement for conveying the smoke with steadiness into the chimney, and for distributing warm pure atmospheric air into the apartment through apertures in the moulding above the fire-grate.

In 1839, No. 7,947, consists of an arrangement of circuitous flues, and a contracted chimney aperture for obtaining a control over the heated air escaping up the chimney. For the dispersion and circulation of warm air within the apartment, apertures of ingress and egress are provided in the facings of the stove, for the admission of cold external air, and its subsequent dispersion, when warmed, into the room.

In 1840, No. 8,360. The grate is constructed with hollow sides and back, in connexion with a pipe from under the hearth for the supply of external air, which, warmed in passing round the fire-grate, is either distributed into the apartment or through conducting pipes elsewhere as desired.

In 1844, No. 10,248. Air as derived originally from some external source, and heated in its passage through hot-air chambers at the back and sides of the stove, is diffused over and above the fire, the stove closing above by the register flap or cover. The recently constructed stove by Stevens, and the deflecting guard, is analogous to this in principle; combustion in both cases it is designed should be intensified by the distribution of hot air over the burning surface of the fuel.

In 1852, No. 1,015. Air is supplied through gratings in the lower part of the side vertical supports of the mantelpiece, is conducted around a space at the side and back of the grate, and is suffered to escape through apertures placed vertically above the lower gratings, and is thus diffused into the apartment. In the same year, No. 1,167, a hot-air chamber is constructed beneath the hearth in connexion with hot-air chambers, one on each side the fire-grate, and is supplied with external air, which, when warmed, gains admission to the apartment through openings in the side cheeks of the stove. A ventilator is fixed high up over the fire-place near the ceiling, for the escape of impure air into a pipe placed in the chimney flue.

This, so far as an opinion may be allowed on a form of construction known only by description, and not by actual trial, may be considered one of the nearest approximations to that which is desired, of any, belonging to this division.

In 1853, No. 2,495, specifies an arrangement of air-chambers and lateral openings of communication in the grate for the circulation of air, about the fire, by this means to be heated and subsequently distributed into the apartment through the ornamental open work of the mantelpiece, and its vertical supports on each side; the grate is furnished on a level with the top bar with a horizontal grating, having a central adjustable cover; when the cover is off the heated air, &c. escapes directly into the chimney; when on, the heated air is distributed through the various air chambers about, and finally into the apartment.

In 1856, No. 468 (provisional protection only) is a plan for surrounding the fire-grate at the sides and back with a space for the circulation of air, which is to be dispersed through perforations in the front and sides of the stove into the apartment.

Of fire-grates of this division, it will be perceived that their proposers aim at increasing the ventilating agency of the fire, when situated in an ordinary apartment, and endeavour to conjoin with it a function which it is not calculated to perform for various reasons. The one great source of the the generally defective warming of an apartment arises from the continuous demand made by the fire upon the air of the room for the support of combustion; a demand which at the same time causes the withdrawal of air from below that elevation where it is least impure, and least desirable to be withdrawn. It is now proved that when the air for combustion is provided from some external source, independently of the apartment, and directed to the fire from a level near the floor, a more uniform temperature, and freedom from drafts, or differently heated currents, is found to be obtained.

It is likely that ventilation might be favourably promoted by apertures distributed at intervals in the cornice of the ceiling, for withdrawing the spent and warmed air of the apartment at that elevation. The same purpose might in part be served by an aperture in the cornice into the chimney shaft. Generally speaking, attempts to promote ventilation have been made too low down in the room; the evils of these plans have already been commented on sufficiently to show that the circulation of the air of an apartment should be promoted at some height above the chimney breast.

In 1851, Professor Hosking, in a lecture at the Royal Institution, suggested the following rudiments of construction for a fire-grate, by which the fire of an apartment should contribute to fulfil all the conditions necessary to the ventilation of the room in which it might be situated; its description may be appropriate, as belonging to the preceding division of fire-grates, and offering fewer points of failure in this often tried endeavour to make one contrivance do the work of two.

The fire-grate is set so as to allow a space between itself and the brick-work setting, and is closed at the top by an iron plate, open only for the register flap or valve over the fire itself. External air is admitted to the closed chambers by a pipe in communication with the outer air, and is directed in any way most convenient under the hearth in front, and so to, and under the hearth at the back, in which sufficient holes are made to allow of the air entering by the tube or channel to rise into the chamber about the fire-box or grate; openings of any desirable form may be made through the cheeks of the grate, into the air chambers at the level of the hearth.

An upright metal plate set up behind the openings in the cheeks of the grate, but clear of them, bends the current of warm air in its passage through the inlet holes, and thus compels the fire to allow what is not necessary to it, to pass into the room, and if the opening over the fire to the flue be reduced to the real want of the fire, there will remain a considerable supply of tempered air waiting only an inducement to enter for the use of the inmates of the apartment. An opening directly from the room into the flue upon which the fire is acting, at a high level in the apartment, will afford this inducement, by allowing the draft in the flue to act upon the heated and spent air under the ceiling, and to draw it off; thus inducing a flow of the fresh and tempered air from about the body of the grate into the room.

In 1845, a scheme for ventilation, in combination with the fire-grate and chimney-shaft, formed in part the subject of a patent, No. 10,501, by Mr. Leslie. The fire-grate is placed near the floor, is of no great depth, but presents a large frontage of fire-surface. From the back of the grate to the cornice of the ceiling a long opening is made into the chimney, from two to four inches in width, into which, from an aperture near the ceiling, all impure air is provided with a ready entrance from the apartments. The ventilating passage is furnished with metal slides, to diminish when need be the upward current through, and to establish a controlling power over the spent air escaping from the apartment. In this specification no mention is made of the currents of external air supplied to the fire in front, as in the construction previously described and subjected to trial by the Commission.

As early as 1795, external air was conducted from some source out of doors, for the supply of combustion, but without reference to the return of any part of it to the apartment in a tempered condition. In this year a patent, No. 2,071, was taken out for "an economical fire-place," through the grate of which was passed a vertical pipe or flue, perforated in those parts situated within the fire.

The effect of this simple contrivance for the dispersion of a body of atmospheric air into the fire in thin jets or streams is necessarily to create a very active degree of combustion within the influence of the air so distributed. It is, however, a crude application of a principle good in itself, and necessitates a perfect control over the amount of air supplied into the fire, and its rate of ingress, with a power of cutting off the supply when need be, a power afforded in Leslie's construction by turning away the pipes or blowers when their continued action is no longer desirable. The action of a current of air supplied into the fire, as in each of these constructions, is not to be doubted, in regard to the intensity and speed of the combustion promoted. The economy of the plan, however, is more than questionable.

A portion of the heat intensified by this mode of construction, and which would otherwise escape, is in the specification of 1795, proposed by the patentee to be reflected into the room by the aid of a suspended movable reflector. The introduction of this new method of distributing heat leads to the consideration of a division of fire-grates constructed with a view to promote the economisation of fuel and heat by combining reflection from polished surfaces with conduction and radiation.

SECTION VII.

For economising Fuel and Heat, by combining Reflection from polished Surfaces with Conduction and Radiation.

Grates of this construction are for the most part costly, and require not to be circumscribed in the area and extent of metal surface they present, thus applying rather to large rooms; and are expensive in regard to the care and attention necessary to preserve their polish unimpaired. The increase of heat by this method of construction is no doubt considerable, and equally so the air of bright cheerfulness diffused around by an open fire-grate, which presents divergent and inclined metal surfaces, reflecting on all sides the brilliancy and warmth of the fire within. Generally speaking, they are among the most elegant designs of stove manufacture of which so many have been produced of late years, that the fire-grate (in itself the most homely and necessary of servitors) has been transformed into another of the many ornamental and tasteful adornments of luxury.

In regard to the value of these fire-grates, for effecting an economy of fuel, little can be said. It is true that radiation and conduction are of high importance, when brought in aid of the maximum intensity of heat to be derived from a main source, but the means by which this augmentation is effected, in the present case, is too expensive to be adopted from regard to its real utility in economising fuel. We should be sorry however to throw discouragement upon the manufacture of these elegant forms of fire-place, for whilst we are desirous to point out, if possible, sound principles of construction, combined with real economy, we are equally desirous to see them carried out in conjunction with every appliance with which modern ingenuity can surround them, in harmony with the elements of true taste and correct design.

The earlier modes of applying reflecting surfaces involved but slight deviation from the usual method of construction. It is about the year 1852, that they were made to form such prominent accessories to the more elegant and expensive forms of fire-grates.

The construction already mentioned, No. 2,071, in 1795, employs the expedient of a suspended moveable reflector, either elliptical, spherical, circular, or flat.

In 1805, No. 2,839, polished metal reflectors are placed on each side the fire-place, to be turned at any angle to reflect the heat of the fire into the room, or to slide away into a recess when not required.

In 1816, No. 3,999, the fire-grate is enclosed within a hollow metal globe, opening in front of the grate. This belongs to a separate order of stoves, to be noticed presently.

In 1822, the hearth is constructed of a perforated metal plate, but rather with regard to the convenience of an ash-box below, than with reference to the radiation derivable from it.

In 1852, No. 552, a hearth of radiating metal bars is constructed, arranged in a double set; the bars of the one set are fixed, those of the other are moveable and intermediate, and situated below the open spaces between the bars of the upper set, thus forming a closed receptacle for ashes, &c. The hearth is slightly convex, so also is the surface of the upper bars, with the view of adding to their reflecting power, both singly and in conjunction.

In 1852, No. 1,015, the lower part of the fire-place is filled in with a metal apron of open work, with a view of increasing heat by radiation. The apron turns upon a pivot, and is made to serve as an appliance of domestic utility. The upper part and cheeks of the stove are of highly polished metal to act as reflecting surfaces.

In 1852, No. 1,167, the hearth, cheeks and facings of the stove are of polished steel, and beneath the grate is an ash-pan, likewise of steel. The grate is deeply recessed, and the entire arrangement of the fire-place has reference to the radiation and conduction of heat.

No. 100,004, in the same year, is an elegantly constructed grate. The front bars are cast in one piece, with a metallic plate or surface extending into the room, the bars being vertical instead of horizontal, and inclining in a vertical plane inwards, so as in part to overhang the fire. By this arrangement the bars become greatly heated, and this heat by the aid of continuous metal surfaces is conducted and radiated around.

Among the most elegant and not the least costly of this division of fire-grates, is the well known invention of Mr. Sylvester. The hearth is formed of a framework of hollow radiating metal bars, diverging and fan-like in arrangement, upon the furthest end of which the burning fuel is supported. The air for combustion passes through the hollow bars to the fire, which also derives a supply in front, in the usual way. The ends of the bars on which the fuel rests become intensely hot. The remaining portion, or hearth, from conduction, becomes likewise heated, and radiates its warmth around; the fire being situated upon the hearth, allows the greatest possible length of surface to the cheeks or sides of the stove, which are of polished metal, and contribute greatly to the amount of heat afforded by radiation. The smoke escapes through the apertures of a kind of louvre at the back, and the ashes pass between the bars into a receptacle beneath.

This construction and the one above are very similar in regard to the heated fire bars being made the main source of supply for conducted heat. The difference of the two methods employed to effect the same result is not without a degree of interest, and indicates the necessity of exhibiting, in a general report upon inventions, an outline of the precise details of construction. Every mode of construction is founded on certain principles. With a knowledge of these principles, the difficulty of carrying them into operation in the most effective and least complex way, to be adaptable to grates of a homely and inexpensive make, and equally so to those forms not circumscribed as to cost, is very considerable. We think it likely that the exhibition of the various plans which have been employed for carrying into practice the principles on which combustion is known to depend, may be suggestive of fresh methods to overcome the difficulties which attend the construction of fire-grates to suit our improved views of the economization of fuel, and the diffusion of an equable and warm temperature over the area of our apartments. Much is at all times gained to inquiry by a review of progress and its attendant failures, the study of the former oftentimes conveying only half its lesson without the study of the latter.

It is not difficult to understand how that those forms of fire-grates which involve troublesome and expensive alterations in the floor and surrounding brick-work, have been disregarded in favour of others less effective, and perhaps scarcely less expensive, from the facility with which they may be adopted; and it must be remembered, that we are all of us generally more willing to put up with a recognised and even faulty contrivance, than undertake the experimental proof of other and sounder plans wanting the established proof of long sanctioned use. The only means by which to overcome prejudice, and prepare the way for the reception of any real advance in point of improved construction, which the honest manufacturer may be enabled to bring forward, is to impress upon the public at large the legitimate action of the fire, the laws on which it mainly depends, and by which it is best promoted.

SECTION VIII.

Open Fire Grate Stoves.

A class of open fire-grate stoves, which endeavour to unite the appearance of an ordinary grate and fittings, with the advantages and convenience of a portable stove, may be next mentioned. This construction, with the difference of not being recessed in the chimney place, differs but little from that of fire-grates which endeavour to economise heat and fuel by aid of hot air chambers and metal fittings. The earliest occurs in 1781, No. 1,304. In this invention, the fire-grate occupies the same relation to the metal fittings around as it ordinarily does, making allowance for the antique style and design of the period, which in its simplicity and evident suitableness to the purpose intended, might be imitated at the present time with advantage. The case, which is quadrangular, and open in front, is provided with a double back or air chamber, into which air is conducted from some external source, which passing upward in a tortuous direction becomes tempered, and is permitted to pass out into the apartment through apertures in the side of the chamber. The smoke escapes through a pipe passing vertically up from the top casing of the stove. This is the permanent disfigurement of the contrivance, which, in other respects, is to all appearance an ordinary fire-place of the period.

The invention is of interest, as combining at a very early period sound principles of construction, and seeming to be the original of its class; one of its appliances, moreover, has recently formed the prominent feature of a patent, No. 2,822, in 1855, based upon the adoption of a double back or air chamber applied to a fire-place, which, intended to combine the advantages of the fire-place and stove, is in reality another of that division of fire-grates which transmit warm tempered air into the apartment from adjacent air chambers. In this construction, the front plate of the stove, instead of being recessed, is flush with the line of the wall, so that the grate projects into the room. At the back of the front plate is a hollow casing or air chamber, and over the fire a canopy of open work, through which the warm air from the chamber at the back passes out into the room; and it is the interior of this air chamber, and its similarity of construction to the one already mentioned, that forms the present subject of remark. In that of 1781, the air chamber is fitted with three rows of horizontal shelves, the centre row open to the sides; the two side rows, one on each side, open to the centre; the air, therefore, which enters from below, is compelled to follow a zigzag or tortuous direction until it passes out at the apertures in the side. The intention is to delay the air in its passage up through the chamber, and bring it in contact with a series of heated surfaces, from which to derive an increase of heat. In the modern application of this principle the arrangement is identical, with the exception that a vertical dividing piece down the centre of the air chamber is omitted. The horizontal shelves are cast in one piece with the sides of the double casing, so as to lose no source of heat derivable from conduction. It is remarkable, that there is no mention of this peculiar form of construction, between the years 1785 and 1856. The modern fire-grate to which it applies is not removable from the wall, and is found in action to answer well.

In 1856, No. 414, is an open fire-grate stove of the same type as that of 1781, but in accordance with modern taste, and of elegant design. It is chiefly remarkable from the fact of its combining various appliances, all of them good. The interior of the metal casing is lined with fire-brick, so is the back of the grate. The exit-pipe, instead of being led from the top, passes out at the back of the stove. The hearth is radiating or fan-shaped, and raised above the ground; within it is a sunk ash-pan. The grate turns upon an axle or pivot, to discharge its contents before cleaning; a metal blower in front serves to regulate the draft; a moveable cover over the bars of the grate acts as a damper when required; both applied together give security against fire.

There is one other construction belonging to this division that may be noticed. It is included in the specification, No. 100,004 in 1852, which refers to a mode of construction, by which the bars and metal hearth of the fire-place are cast in one piece together, for deriving the greatest degree of heat possible from conduction. The stove is constructed on exactly the same principle as the fire-grate. It is enclosed on all sides but the front, which is of somewhat extensive area, and presents an extent of metal surfaces or reflectors. The back is curved, and somewhat overhanging, to induce additional heat from radiation and tend to the diminution of smoke. The exit flue passes out of the back into the chimney or elsewhere as desired.

These two different constructions of fire-grate stoves, together with the foregoing, are sufficient to show the principle of their action, which is but little different from that of the ordinary fire-place, almost every form of improvement applicable to which is applicable to these open stoves, excepting that class of improvements which have reference to alterations of brick-work, setting, &c.

The fire-grates constructed by Mr. Pearce, and in use at the London Hospital, are constructed upon the plan of the same early invention, according to the description furnished to Mr. Campbell of the Board of Health, who visited the London Hospital with a view to inspect them, and report upon their action to the Commission. The stove is described as resembling in appearance an ordinary fire brick grate; the back of the fire-place is composed of fire brick, behind which there is an iron lining, and behind the lining a chamber in communication with the external air, a supply of which is distributed warm and pure into the interior of the ward in which the fire-place is situated.

There are three stoves constructed by Mr. Pearce, and differing slightly from each other, in use at the London Hospital. In reference to them, the house governor informed Mr. Campbell that the principle of their construction was very old; that he had seen such stoves in an old house in the neighbourhood, and had advised similar stoves to be set up in the hospital. The first was completed and brought into action about the year 1853.

Section IX.

Miscellaneous Improvements, including Facilities for Diminishing the Dirt and Waste of an Open Fire-place; Blowers and Screens; attached Fire-guards, and Facilities for quickly Extinguishing Fire.

There are various mechanical and subsidiary adjustments in connexion with different methods of construction, that deserve a passing notice before quitting the subject of inventions, particularly those which aim at diminishing the dirt and dust attendant upon the open fire-place, and those which tend to promote security from accidental fire.

The arrangements of an open fire-grate in regard to clearing it of its contents before lighting, are it must be considered open to improvement, and in their present imperfect state tend not a little to neutralise every other endeavour for promoting cleanliness during the day.

With a view to obviate this inconvenience, in 1802, No. 2,669, the fire-grate is made to turn upon a pivot, and discharge its contents over a chamber at the back, covered with a sloping grating, through which the dust, ashes, &c. pass, while the cinders roll back again into the grate, the chamber communicating with an ash-drawer beneath.

In 1856, the grate is made to turn upon an axle or pivot for the purpose of being inverted in cleaning it, but without the chamber at the back.

In 1849, the grate is not attached to the sides of the fire-place, but is supported on feet for the purpose of being carried out of the room to be cleaned and made ready for lighting. By this method the heat derivable from conduction is in great part lost.

In 1856, No. 961, for the purpose of separating the larger cinders from the dust and ashes, a movable tray of net-work or perforated metal is placed between the bottom of the fire-grate and the stove. Partly with the view of concealing the ashes, and partly with the view of radiating back the heat of the fire from below into itself, a series of inclined metal plates is placed between the grate and the separator, movable on pivots, to be turned at any angle to reflect back the heat into the fire. These reflectors offer no impediment to the cinders falling through on to the separator, and the dust and ashes falling from thence into the ash-pit below.

In 1856, No. 106, is specified an arrangement analogous to the "separator" for maintaining a supplementary fire with the combustible residue falling from the grate, by placing beneath it a second grating with close bars, so that the small fuel discharged from above may be retained in a state of combustion; the dust and ashes of both fires falling through into an ash-pan placed below for their reception.

As a domestic appliance, for promoting convenience and economy, the separator may possibly be of value.

The construction of the back-hearth under the fire grate, and the facility afforded for concealing and removing the waste fuel and ashes below, are minor details of great importance to the cleanliness and comfort of the open fire-grate. Various modes of construction have been adopted, but they apply rather to the more expensive forms of fire-places. The earliest mention is in 1795, No. 2,056, in which a space below the fire-grate is enclosed for the reception of the ashes, which are conveniently carried away by pulling out a drawer in front. The ashes therefore, instead of falling to the level of the hearth, are received at a little distance below the fire-grate.

In 1822, No. 4,744, a receptacle is formed within the hearth, covered over with a movable metal plate of openwork, on a level with the floor. The ashes fall through the openings of the metal plate, and are easily taken out on its removal.

In 1825, No. 5,190, the stove is constructed so as to dispense with the necessity of a fender, being placed upon a hollow basement of metal or stone or marble, within which is the ash-drawer.

In 1852, No. 552, is a radiating hearth-plate, consisting of a double set of bars, between the alternate spaces of which the cinders fall on to a lower level.

In the same year, a simple receptacle of polished steel is employed for the same purpose; likewise an ash-drawer to pull out from under the heavy radiating plates of the fire-grate.

In 1854, No. 1,168, as applied to Mr. Jeake's Arnott, instead of a stone hearth, a removable metal screen is employed, covering an ash-pit for the reception of the ashes which fall from the fire-place.

In 1856, No. 694, an ash-pan is constructed, which consists of two distinct parts; the one, an open tray fitted to the size and form of the back-hearth it is to occupy; the other, a perforated or wire-work screen, placed a little above the bottom of the tray, for the purpose of separating the smaller fuel from the incombustible ash. Upon this screen is arranged a series of metal slips, like the laths of a Venetian blind, or properly speaking similar to louvre boards. They are of polished steel, and have the advantage of reflecting the heat upwards from the fire into the room, and of concealing the refuse ash which slides between them. These metal slips may be made to turn upon pivots, so as to be brought close together to prevent the escape of dust, &c., in sifting the ashes into the pan, or they may be simply fixed and removable with the tray.

This is one of the most useful and desirable of accessories to the cleanliness, comfort and appearance of an open fire-grate. It is capable of being adapted to any ordinarily constructed hearth, is simple and inexpensive, and well suited for general use.

There is one point in regard to the management of a domestic fire, the inconvenience of which every one must have experienced in a greater or less degree; we refer to the want of a ready means of extinguishing the fire when required, it being at present best performed by taking off the greater part of the firing, and laying it on the hearth, or on either side the grate, at a considerable risk of accidental fire, and injury of the appliances belonging to the stove. A very simple contrivance might remedy this inconvenience, such as that of a metal case, as patented in 1805, No. 1,859, for putting over the fire and causing it to be extinguished without dust or waste of fuel, or by a vertical screen to pull down from above, or draw forward from the sides.

The last mentioned method is adopted in 1854, No. 1,857, a moveable shutter of metal or other material being suspended within the stove to draw up or down, wholly or partially at pleasure, to regulate combustion and extinguish the fire when required, without dust or inconvenience, by the simple exclusion of air.

These appliances are in themselves so simple, that any stove might be provided with either of them as most convenient, and at very trifling additional cost.

The moveable shutter is also a useful appendage in regard to promoting a differently active degree of combustion, according as it is raised or lowered. In 1853, No. 127, the blower has a sliding movement like a casement before the fireplace, and may either regulate the draft above the fire, be applied before it as a damper, or close in the ash-pit as desired. It may also be used in conjunction with another plate, the one extending from above downwards, the other from below upwards, in which case combustion is shortly extinguished.

In 1810, No. 3,313, a blower is attached to the front of the fire, which is adjustable at pleasure, and can be made to slide quite away when not required.

In 1856, the place of the blower is supplied by two iron plates which turn on pivots, and are made to swing from the cheeks to the front of the stove, with sliding plates, one on each side, to meet and close together above the fire-place.

In 1856, No. 414, two covers are applied to the fire, either separately or together as required; the one when placed above the fire, serves as a blower, the other when applied before the bars acts as a damper, the two together serving to maintain a very slow combustion, and to extinguish the fire speedily when required.

There is yet a minor appliance to mention, the necessity of which cannot be too strongly dwelt upon; it is that of a moveable screen of wire-work or some analogous fabric to pull down or draw out in front of the fire-place to serve as a guard against accidental fire; this might with little difficulty be arranged, and, if universally adopted, would have a great tendency to diminish the number of accidental fires, involving injury or loss of life and destruction of property. In 1802, No. 2,669, this was carried out as applied to a register stove by two circular pieces of wire-work which were made to draw out, one on each side of the fire-place, and to meet in front, thus enclosing the fire within a most efficient and easily removeable screen. It is remarkable that this obvious and easily contrived arrangement should not have been more often applied. There is occasional mention of its use in relation to a class of stoves intermediate between the ordinary fire and the close stove, but more nearly allied to the latter, and which may be called vase-stoves in allusion to their exterior design; several among these are provided with wire-screens to draw forward and enclose the fire beyond the power of inflicting injury.

SECTION X.

Stoves in general.

It is much to be regretted that the Commission were not able to include in their experiments the action and effect of close stoves as applied to dwelling-houses. In this country a very general and well founded prejudice exists against them from the deterioration caused in the air of the apartment they are employed to warm. Although varied in the details of their construction to an extent beyond the limits of the space which we can devote to their description, they may be divided into two distinct classes, viz., stoves which warm the air by simple contact with their heated surfaces, and stoves which supply a continuous flow of hot air into the room. The effect in both cases, however, is to dry the air to a more or less injurious and uncomfortable degree, and to render it indispensable that the humidity of the air be promoted by artificial means, such as the exposure of a surface or surfaces of water, and that an active degree of ventilation be maintained by some distinct contrivance in the upper part of the apartment. The radiation of heat from close stoves is small, and they promote little more than the degree of circulation effected by the heated air in contact with them, rising upwards and mixing with the air of the apartment, and differing materially from the circulation produced by an open fire, the heat radiated from which is great, and passes in divergent rays or streams direct to the various surfaces in and about the apartment, which in their turn become the means of distributing the heat they have received; this process of radiation and re-distribution is continuous and independent of any particular construction of fire-grate, but is better performed in some forms of construction than in others. On this reasoning alone it will be seen that the stove heats the room mainly by contact communication from a small surface at a high temperature, whereas the air of an apartment warmed by an open fire is heated by contact with large and various surfaces at a moderate temperature, such as the walls, the floor, the ceiling, and the various articles in the room. The amount of air withdrawn by the stove for the purposes of combustion in most cases is insignificant, and, even if it were not so, the withdrawal of a large amount of air from the lower level of the apartment is undesirable. The temperature of a room heated by a stove is well known to be far more uniform than the temperature of an apartment warmed by radiated heat from an open fire, and arises chiefly from the causes above mentioned. That the uniform temperature obtained by the use of the stove, and combined as it may be when required with a continuous warmth night and day, with saving of expense, dirt, and the labour of attendants, are inducements to its use, and are important elements of comfort, is readily to be admitted; but these are some only of the essentials to health and comfort which have never been conjoined in the required degree by any form of stove ordinarily employed in our domestic homes.

With the view of rectifying the small amount of circulation in the air of an apartment heated by a stove, it has been attempted in some constructions to create an additional draught round or through some part of the casing of the stove into the flue; and in one case, by withdrawing the air for combustion from a part of the room near the ceiling, where the air is most impure. This last is good in principle, but it is probable that the amount withdrawn is scarcely appreciable with regard to the supply of impure air arising continuously from the lower part of the apartment. In hot-air stoves warm or heated air ascends through pipes surrounding the body of the stove, which are open above and below, or through perforations in the outer casing, in thin divided streams, for which purpose there is a space or hot-air chamber provided between the outer casing and the body of the stove; in all cases the products of combustion are passed away through an exit flue leading to the chimney, the air circulating about the stove and into the apartment being that previously withdrawn from the room, or supplied from some external source. Others, of both constructions, aim at distributing the supply in a better hygrometric condition, in one case by conducting threads leading from a reservoir of water on the stove into the hot-air pipes surrounding it; in another by the hot air being brought in contact, previous to its distribution, with water placed within the casing of the stove; others again employ pottery ware and fire-brick as the material of the stove, and cause the air to pass up vertical grooves or channels in the absorbent mass, to diffuse a mild and equable warmth.

In the Appendix, a list of patented inventions is subjoined, relating to various constructions of close stoves for warming and heating purposes, but including those only which are provided with an exit flue for the escape of the smoke and gaseous vapours of combustion. Stoves without an exit flue have been considered too deleterious in their action to be included in the present inquiry.

The close stove under any form, or however applied, is objectionable and highly injurious, when its external surface is suffered to become greatly heated. The air in contact with it becomes burnt, acquires a disagreeable smell, and in a short time is utterly unfit for respiration. The same may be said of stoves which distribute air at a high temperature into the room. One of the most useful and generally applicable of the different stoves now in use is that invented by Dr. Arnott, and generally known by the name of the inventor. It consists of an exterior metal casing of any form desired; the fuel is enclosed withinside in a box of fire-clay, with a grating at the bottom, over the ash-pit, which is formed by the base or pedestal of the stove. Above the fire-clay box, which is open at the top, is placed a fuel receiver, with a charge of coal or other fuel for at least 24 hours, which descends as the fuel in the box consumes. The receiver is made air-tight by a lid fitting in a ring of sand, and is removed only for the purpose of supplying the charge. With the view to prevent the casing from becoming overheated, the fire-chamber and fuel-feeder are enclosed, and are separated from the outside case by an air chamber, the products of combustion being passed away through an exit flue into the chimney. The air for combustion is admitted by a small aperture in the ash-pit in connection with a valve, and passes up through the grating underneath the fire-box, and thus keeps the lower part of the fuel, when once ignited, in a state of combustion. The amount of air admitted through the valve in the first instance was governed by a self-regulating apparatus, on the principle of the expansion and contraction of air confined by mercury or other fluid, by which the heat of the stove itself was made to regulate the fire, and maintain it at any uniform temperature required. This thermal regulator has, however, been abandoned for one adjustible by a shifting weight. The fuel employed may be either coal, coke, or anthracite, and the amount of air admitted to support combustion is extremely small; the thickness of fire-brick which surrounds the fire, concentrates a very intense heat within the stove, whilst the outer casing is preserved at a moderate and agreeable temperature.

The drying effect which all stoves exercise to a greater or less extent upon the air they warm, calls, as we have observed, for some appliance to promote the degree of humidity essential to health and comfort, whilst the uniform temperature and freedom from draught maintained by them, points to the necessity of a very efficient system of ventilation in connexion with their use. It is remarkable that most of the attempts made during the greater part of the last half century to improve the construction of fire-places have had reference to their increasing the circulation of air, and promoting the ventilation of the room in which they are situated; whilst the stove, which, from the principle of its construction, cannot be employed to ventilate conjointly with its legitimate action of heating, has been accepted in its one capacity, and applied to the warming of apartments, with no additional provision for ventilating the room to any appreciable degree; and hence the primary evils of its construction have been greatly aggravated.

The departure from the proper degree of humidity that stoves occasion should be remedied, if possible, on a regulated system, and not entrusted to the dictates of personal sensation, or mere guess work, in the mode of supply. The questions we require to have determined, in connection with their use, have reference to the amount of moisture requisite to promote the necessary humidity of the air at certain temperatures within the apartment, considered with reference to the temperature of the external air, the number of cubic feet of air within the apartment, and an approximate estimate of the amount of fresh air circulating through it; in other words, how much external air within a given time flows into the apartment to be heated. In regard to the solution of these questions, we know that air, between the temperatures of 30° and 70°, has its capacity for moisture doubled for an increase of less than 20° of temperature. Thus, at 30°, when saturated with moisture, the air contains two grains in a cubic foot; at 41°, it contains three grains; at 49°, it contains four grains; and increases to five grains at 56°, to six grains at 66°, and seven grains at 70°. When, therefore, the air of a room is warmed sufficiently, should the external temperature be low, and contain but very little water as invisible vapour, the air of the apartment will become very dry, and create a sense of discomfort and uneasiness to the occupants of the room exposed to its influence. It is absolutely necessary that water be present in the air, to the amount of little less than three grains at 50°, to four grains nearly at 60°, and to more than five grains at 70°, in every cubic foot of air. The wet and dry bulb thermometer furnishes a measure of the amount of water present in the air, and the above amounts will be present when the wet bulb thermometer reads about 45°, 54°, and 63°, respectively, and the simultaneous readings of the dry bulb thermometer are 50°, 60° and 70°, respectively. It is therefore evident that the dry and wet bulb thermometer should be attendant on the use of the stove, as applied to apartments. The instrument is simple in its construction, inexpensive, and involves no difficulty in its management. Thus far the solution of the problem may be performed satisfactorily; but the means for supplying the deficiency of water in the air, indicated by the wet and dry bulb, are crude and unsatisfactory, and consist in the exposure of a more or less extent of water surface in the room, the amount of vapour given off being great in proportion as the surface of water is extensive. With so delicate an indicator of the various hygrometric changes within the room, the distribution of the vapour should be made to proceed simultaneously and in accordance with its indications, and the water for evaporation should be contained within a vessel of a certain estimated capacity, graduated to afford an exact knowledge of the amount of surface to be exposed, according to the reading of the hygrometer, whether detached from the stove, and the water consequently of the same temperature as the room, or placed upon the stove, in which case a smaller vessel would suffice, as the water, becoming heated, would give off a greater amount of vapour, and more quickly, from a smaller surface. The best practical method open to us therefore is the placing upon the top of the stove a vase, or other vessel, either open or closed, with a perforated cover; the heated air surrounding and in contact with the stove, in its ascent would mix with the vapour rising from the water, become speedily diffused, and exercise a very sensible and beneficial effect upon the health and comfort of the occupants of the room.

Until more accurate means shall be devised, experience will enable us to determine approximately the varying quantity of water necessary to be exposed to vapourise the air, in accordance with the indications of the wet and dry bulbs. The vase, or receptacle of water, should be regarded as an indispensable adjunct to the stove, and no more to be dispensed with than the fender before the fire-place, or any other common-place accessory established by long use as requisite to the comfort and the ordinary habits of domestic life. It would be well if the vase, or any other convenient receptacle, were cast with the metal casing, and lined with some innoxious material, or moulded in clay, and included in the original construction of the stove.

The deterioration of the air caused by bringing it in contact with an overheated surface of metal, should be avoided, for it thus becomes unfit for the purposes of respiration; "causing the air" (in the words of Dr. Arnott) "to acquire a burnt and often sulphurous smell," which renders it offensive and inimical to life. The external heating surface of the stove should be only of a moderate degree of heat, and the possibility of maintaining a genial equable warmth in a room, by means of a heating surface not very greatly above the temperature of the apartment, is proved by the action of Arnott's stove; one of the peculiar merits of which is the moderate degree of heat at which the casing is maintained. Whether the opening of channels of ingress and egress for the admission of pure air into the apartment, and the withdrawal of the foul air, for the purposes of ventilation, would, by promoting a continuous change of air, interfere with the sufficiently heating-power of the stove, in its ordinary mild action, is an open question, and only to be resolved by actual experiment.

The possible escape of any portion of the invisible vapours of combustion cannot be too sedulously guarded against in every form of stove, and ample facilities of draught and egress should be provided for their escape by a conducting flue into the chimney or elsewhere. The most deleterious forms of stoves are those which have no flue for the escape of these incombustible gases, which, suffered to mix with the air we breathe in the confined limits of an apartment, exercise a poisonous effect on respiration. In fact, the use of such stoves, whatever be the nature of the fuel employed, should be entirely avoided.

When we take into consideration that while the stove exercises its legitimate action of warming the air of an apartment, it fails to ventilate it in any appreciable degree, that its outer casing is frequently at a temperature to deteriorate the air by contact, or, if not, to dry it to a very discomforting degree, and that the fire is closed from view, the general prejudice in disfavour of its use is easily to be understood. The latter objection has, however, in some cases, been removed by inserting a plate of transparent mica in the side of the stove, whereby the fire is brought to view. But this improvement is not applicable to Arnott's construction.

By the foregoing facts we are led to the conclusions that the outer surface of the stove should be only moderately heated; that the hot air, if any, be supplied at a moderate temperature, and that both the heat of the stove and the temperature of the hot air should be under regulation and easy power of control; that there should be at all times a flue or pipe for the passage of the smoke and gases; that humidity and ventilation should be each specially promoted, the two latter independently of the heating action of the stove; that pottery ware and fire-brick, as good absorbents of heat, and emitting no offensive odour when at a high temperature, are suitable materials for construction, providing that the combustion chamber be enclosed, and the products drafted away, lest any noxious gases generated by intense and slow combustion, should percolate through the porous material into the apartment.

Scientifically conducted experiments, however, are still wanting to test the action of any form of close stove; and the above remarks are founded only upon the laws of combustion, and on those of the generation and diffusion of heat over limited areas of space as confirmed by experiment.

There is one class of stoves yet to be noticed, which, if not likely to come greatly into use, has the merit of comprising some of the most elegant, and innoxious forms of construction which have been employed. The fire is contained within a vase or urn, which may be open, or closed with a perforated cover; the urn is supported on a pedestal, and stands in the position usually occupied by the fire-grate, or within a niche prepared for its reception, or in any convenient part of the apartment, in which latter cases a downward draught and descending flue is employed to carry away the products of combustion, and permit only the escape of radiated heat from the fire contained in the grate or urn. The principle of these vase stoves has been applied to other forms of stove-grate, but the vase is the prevailing form adopted. In No. 2,558, in 1779, the fire is enclosed in an open vase upon a pedestal, and occupies the position of the fire-grate in the chimney-place, the draught being supplied up through the pedestal; the smoke, vapour, &c. from the fire ascending in the usual way up the chimney. In No. 3,049, in 1847, the vase stands upon a close stove, and acts as a hot-air distributor. In No. 3,287, in 1809, the fire is enclosed in a double dome which rests upon a platform, and affords a view of the fire when required; the smoke, &c. passing away through a flue, the heated air alone entering the apartment. In No. 3,331, in 1810, the grate, which may be of any form desired, is enclosed on all sides but the front, the air being directed into the fire through the sides, the smoke, &c. passing away up the chimney. The same principle is applied to a stove for the centre of a room. In No. 3,752, in 1813, the fire burns within an open urn, provided with a downward draught, a downward flue opening into the chimney or niche in which the vase is placed. In No. 3,999, in 1816, the fire is enclosed within a polished metal globe upon a pedestal; the globe is open in front when the fire is in action, which burns with a downward draught, a small grating at the back, in connexion with the chimney, being provided for the escape of the incombustible gases. In No. 2,233, in 1855, the fire is enclosed within a covered urn, provided with a downward draught and descending flue to separate the impure gases from the hot air rising through the perforated cover of the urn into the apartment. The vase stands within the focus of a polished concave reflector, which fills up the front of the fire-place. A list of the patented inventions relating to these stoves between the years 1799 and 1855, will be found in the Appendix, p. 101.

A stove, invented by T. Rammel, Esq., C. E., and patented in 1854, No. 1,808, is of analogous construction to the foregoing, and may be described as follows: the stove consists of a hollow basin, or vessel of pottery-ware, open at the top, and provided with a hollow stem or stand of the same material. The fire rests upon a grating at the bottom of the vessel, and is supplied by a downward draught which passes through the fire into the hollow stand below, containing the ash-pit, from which the exit flue passes into the chimney. The mass of fire-brick which surrounds the ash-pit, and forms the base or stand, is traversed by numerous air passages up through which air rises, is heated, and passes into the apartment. The fuel consumed should be of anthracite coal. The form of the stove may be greatly varied, and can be moulded to produce designs more or less elegant, the fire-holder in all cases consisting of a hollow basin or vessel, open at the top, or closed with a piece of glass having an opening in the centre. In some of these stoves openings are introduced leading from the outside of the fire-vessel into the ash-pit, for the purpose of withdrawing a continuous stream of air from the apartment, in addition to the amount required for combustion, and by this means assist in obtaining ventilation.

One of these stoves was put up at the Society of Arts by Mr. Rammell for trial by the Commissioners, and arrangements were made for the observations to be taken by the secretary of the society, P. Le Neve Foster, Esq. During the course of the inquiry, however, Mr. Rammell was never satisfied with the action of the stove, and never considered it in a satisfactory condition for trial; but so far as examination could lead to an opinion it proved satisfactory, the heat emitted being genial, and sufficiently intense without offensive odour or perceptible escape of gas; the fuel was applied above and in front of the burning embers, and the action of the stove was continuous night and day with small expenditure of fuel, which was of anthracite coal.

In regard to open stoves which stand apart from the fire-place, and burn with a downward draught, it is questionable whether all the gases of combustion are carried through the fire into the descending flue; it is more than probable that some portion, however small, is continually ascending into the up-rising heated air from about and over the stove and fire, and is distributed through the apartment. If the room be not sufficiently ventilated, these vapours accumulating, will in time be perceptible in their effects when continually inhaled with the air of the apartment. If ventilation, however, be sufficiently promoted, they will not be present in the air at any one time to an injurious extent.

Much might be said in regard to the stoves, held in such general favour by northern continental nations, particularly the glazed earthenware stoves of Sweden, which present a large area of heated surface to the apartment, and consume wood for fuel, as indeed is the case with most of the continental stoves, which succeed in maintaining an equable and sufficiently warm temperature where the open fire fails entirely; but, for the attainment of our present object, we have thought it better, and likely to be of more practical benefit, to analyse the forms of stoves which have been in use in our own country, and have been addressed to our daily habits of domestic life. To introduce new principles with any hope of success, for their general and continued adoption, it is necessary to combine them as much as possible with old established methods, and to make them conformable with the most harmless of our prejudices.

In the preceding analysis of the different patents, we have endeavoured to point out the peculiar properties of the different fire-grates, stoves, &c. as they have come before the public, and as recommended by their authors, since the year 1785 up to the present time. These inventions have been numerous and instructive, and although the major part of them have been unsuccessful in operation, many of them nevertheless exhibit great ingenuity in both design and construction, and are undoubtedly real steps in advance. Several among them, therefore, may be safely applied under the conditions recommended in the Report.

The next step in the inquiry was the collecting information from practical men and others in London who used fire-grates of novel construction. From the evidence we obtained, it appeared that a large number of fire-grates of Arnott's construction are in operation, and for the most part with success; and so far as we could ascertain, it seemed that where Arnott's stove had failed it was attributable to mismanagement, or to faults in carrying out the principle of the inventor. One place of failure we ascertained to be the Custom-house, but here we were told that a deep prejudice existed against them by the attendants, and the failure was attributed to this cause. At the Post-office, C. Lewis, Esq., reported that Arnott's open fire-grate gave no trouble, was clean and free from dust in its action, that the walls and floor of the room were always warm, that 22 lbs. of coal heated his room for 15 hours, and that the amount of ash was exceedingly small.

Mr. Bailey, 272, Holborn, and Mr. Edwards, 42, Poland-street, the two most extensive manufacturers of Arnott's stove-fire-grate, were both visited.

Mr. Bailey spoke decidedly in favour of Arnott's grate, and enumerated among the causes of its success—

An almost entire absence from smoke.
Great saving of fuel, 15 lbs. being sufficient for small stoves for 12 hours.
Their lowest price 3 *l.* 10 *s.*

Mr. Edwards conscientiously would recommend Arnott's stove in preference to all others.

The price of one 19 inches wide with 12 inches fire, was -	£. 2	10	–
„ 21 „ 14 „ - -	2	12	–

As the metallic surface increased the price advanced at the rate of 6 *d.* per inch—

The cost of a fire-grate, 19 inches wide - - -	£. 2	10	–
„ fitting and setting - - - - -	1	5	–
„ ventilator - - - - - - - -	–	7	6
The lowest price - - -	£. 4	2	6

By the use of this fire-grate Mr. Edwards said the saving of fuel was 50 per cent. nearly.*

Mr. Jeakes, of Great Russell-street, whose stove is already described, said—

The price of a fire-grate is - - - - - -	£. 2	10	–
„ fitting - - - - - - -	–	15	–
Total cost - - -	£. 3	5	–

But, if 100 were ordered, he could make them for 1 *l.* 10 *s.* each.

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* While these sheets were passing through the press, the Commissioners again visited Mr. Edwards, and found that he had just produced a new smoke-consuming stove for the working-classes. The stove can be adapted for cooking, ample convenience being given for placing saucepans, &c., either over the fire, or on iron plates or holes at the side, to be kept warm. A cheerful fire can be kept up the whole day with a remarkably small consumption of coal. The stove has been tested repeatedly, and the consumption of coal found to be 14 lbs. in weight for a period of from 12 to 14 hours. This is the amount of coal the box holds when filled. The cost of this would be a trifle less than 2 *d.*, supposing the coal to cost 25 *s.* per ton, which is the average price of the best Wallsend coal in London. Not the least advantage in this grate is the introduction of a fire-clay brick back and sides, the benefit of which in retaining heat is so well known. The grate can be easily fixed, no ash-pit being required. The cost of the grate is 20 *s.*, and the expense of fixing is small.

Leslie, of Conduit-street, said that the ordinary consumption of coal for a grate similar to that tried by the Commission, was 30 lbs. a day generally, but that it varied in amount according to external temperature. The amount of ash at the close of a day of 12 hours he stated to be from 12 to 14 ounces; the fire is not entirely free from smoke, but is very nearly; and the chimney is swept occasionally for safety's sake; a thermometer placed on the floor directly opposite to the fire at the distance of four feet, was found to read 78°, and at 10 feet distance to read 72°; one on the wall, in a recess at the height of five feet, on the same side as the fire, read 72°.

St. Martin's Hall, Long Acre, is entirely heated by Leslie's grates. Their action was spoken of in the highest terms, both with respect to the warmth they diffused and the small amount of fuel they consumed. The amount of ash was trifling, but soot was said to be rather abundant.

Mr. N. Defries, 145, Regent-street:

This stove is constructed to consume coal gas, and is made of a very permanent and almost indestructible material, apparently a kind of porcelain, but inexpensive.

With a large grate of this construction, which we saw in the drawing-room of his private residence, a consumption of 50 feet of gas per hour takes place, which is at the rate of 2½ *d.* per hour. For ordinary purposes a grate consuming from 30 to 35 feet of gas per hour would be ample.

The room in which the stove was situated, or rather rooms, contained about 12,000 feet of air; at times, above 100 persons have been present for many hours, without the least inconvenience.

With gas-stoves, no coal-cellar is needed; and in cooking one ounce of meat is saved out of one pound. Also, there are no sparks, no pop-coals, and no danger of fire. Gas may be adapted to common fire-places.

Price's candle manufactory, Vauxhall:

In the first large room were placed two of Jeakes's large stoves, at 45 *l.* each, with two open fires, one on either side; the body of each stove was lined with fire-brick, and the bounding surfaces were warm only.

The chimney is circular, and one foot in diameter; it has an entire casing of metal, 14 inches in diameter, so that there is an inch of air all round. The consumption of coal is considerable, but the stove seems to be well adapted for warming large rooms.

In a small room was placed an Arnott's fire-grate, which acted well and gave no trouble; placed before this grate was a hollow fender of tin, perforated on the side towards the fire; there were also a few perforations on the top, which on this occasion were covered. Two tubes were connected with this fender, one on either side, in communication with the external air. The pure air thus supplied passed into the fender, became somewhat heated, and from thence, as needed, to the fire, or, if quick ventilation was required, to the room by opening the series of perforations on the top of the fender. The interior of the fender was cool to the hand, even at that part directly opposite to the fire, the side away from the fire being sensibly cold. In one corner of this room there was an aperture for the contaminated air to escape. The action of the stove was spoken of well, and seems to be admirably adapted for a quick supply of pure air.

From this room we passed into another, which was heated by Jeakes' modification of Arnott's grate. The action of this form of grate was here spoken of very highly, and was said to be more simple in practice than Dr. Arnott's own form, by affording a ready means of extinguishing or lessening the fire when desired. It is simple in its operation, and effects but a small consumption of fuel.

From thence we passed into a large apartment, heated by hot water, which system was spoken of highly, being effectual and inexpensive.*

G. F. Wilson,

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* Whilst these sheets were passing through the press, the Commissioners again visited Mr. Pierce, of Jermyn-street, and found that he had, since their previous visit, invented a fire-grate, which he called the Fresh-air Fire-lump Grate.

This grate is formed of fire-clay, and consists of open fire-grate bars in front, with the sides and back of fire-clay lumps, around which an air-chamber is formed, communicating with the external atmosphere,

G. F. Wilson, Esq., F. R. S., of Price's patent candle company, has reported upon his experience of smoke-burning house-grates:

"Having proved in our works here and in the north the economy and other advantages of smoke burning, we wished to try the known house smoke-burning arrangements, and therefore, in March 1855, we placed in the counting-house here one of Dr. Arnott's grates, and one on Dr. Arnott's principle, but worked by different mechanical appliances, patented by Mr. Jeakes. Both grates have worked without giving trouble or getting out of repair until the present time; both burn less coal for the same amount of heat than ordinary grates; both give the power of quickly increasing the amount of heat given out, and Jeakes's grate the power of quickly reducing it; both make the size of the coal used of comparatively no importance, as the small coal cakes and thus becomes large before being brought into the fire; and last, but not least, both have, to absent people, the great advantage of rivalling the French wood fires in allowing themselves to be forgotten without going out. In June 1856, I put up one of Dr. Arnott's and one of Jeakes's, at a cottage at Uxbridge; the results there entirely confirm my previous experience here. My brother-in-law, Mr. Harrison, of Weybridge, adopted, in October 1855, Jeakes's arrangement for a hall fire and for ornamental drawing and dining-rooms, as well as bed-room grates; he authorises me to say that his experience agrees with mine. I am told that Dr. Arnott's plan works well in a kitchen range; but of this I have no experience. Dr. Arnott's grate, in one sense, one naturally likes best, from its having introduced the principle of coaling from below instead of above the fire, causing the smoke to percolate through glowing coal instead of going off into the chimney, as in common fires; but perhaps Mr. Jeakes's mechanical adaptation is an improvement; the fire is in my opinion a more agreeable one, and the arrangement by which the bar front is raised or lowered, with its small handle above, out of the way of dirt, is, I think, preferable to the lever by which the coal-box of Dr. Arnott's grate is raised."

Irrespective of the examination of witnesses, and a careful examination of the different plans and designs, instituted for the economy and ventilation of dwelling-houses, we found in these inquiries no information calculated to establish a sound principle of action, either as regards ventilation or the prevention of smoke. In order to arrive at correct conclusions, it was then considered essential to institute a series of well-conducted experiments, under the immediate superintendence of the Commission.

GENERAL BOARD OF HEALTH.—BOARD ROOM EXPERIMENTS.

To determine the temperature, range of temperature, and hygrometrical state of the air, at different parts of the Board-room, as heated successively by Arnott's stove, Leslie's stove, and Leslie's stove raised above the floor.*

The Board-room is 33 feet by 22 feet, and 14 feet in height. It contains 10,169 cubic feet; in it there are five windows, three in the west, and two in the

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atmosphere, and admitting air to a cavity in the lower part of the grate, which communicates with mouths of channels in the earthen lumps that surround the fire. The heat communicated to the air through these lumps, and which, from their small conducting power, rarely exceeds 90 degrees, can never be excessive. Valves are provided for regulating the quantity and temperature of the fresh air admitted, and its distribution into the apartment when warmed.

Some of the advantages of this stove-grate Mr. Pierce enumerates as follows:

1. The position of the non-conducting and powerfully-radiating Welsh lumps around the fire-place makes the whole radiant heat tell in the right direction, and supports a combustion so vigorous and complete, that but little of the fuel is wasted in black or half-consumed ashes, as is commonly the case.

2. The air passing through the lumps takes up any heat that may have penetrated them, and throws it into the apartment without permitting it to be wasted.

3. The provision of a special channel for the admission of air affords the opportunity of deriving it from a fresh and pure source.

By this arrangement, a most effective system of ventilation is established, the deteriorated air passing off by the chimney, and a constant supply of fresh air of a genial warmth unceasingly flowing into the room, in such a manner that no sensible draught is experienced.

* The word stove is used throughout the experiments, and it signifies an open fire-grate.

the north walls, whose area collectively is 240 square feet. The fire-place is situated in the east wall, and the south side is bounded by the President's room and the landing from the staircase.

The experiments were made with instruments constructed by Messrs. Negretti and Zambra, and were all carefully compared with standards, and their index-errors determined.

The instruments consisted of a dry and wet bulb thermometer suspended near the centre of the room, of a second pair placed near the north wall; of a third pair near the south wall, and of a fourth pair near the west wall; those placed near the walls were fixed on thermometer stands, with a small projecting roof from the top, for the purpose of preventing the cold currents of air from passing the bulbs in their descent; in addition, on every thermometer stand a pair of self-registering thermometers were placed, for the purpose of determining the extremes and ranges of temperature, and several other delicate thermometers were suspended with their bulbs in contact with the walls.

The readings of all these instruments, and of all others, were most carefully taken several times daily, by J. C. Haile, Esq.

These observations, with the first steps in their reduction, and discussion of daily readings, together with the times of lighting the fire, the amount of fuel used, &c. are placed in the archives of the Board of Health.

Before proceeding to the consideration of these experiments, it is desirable to review the conditions which render an apartment comfortable and healthy; they seem to be as follows:

That the floor be at the highest temperature in the room.

That the walls be higher, or as high in temperature, as the general temperature of the room.

That the general body of the air in the room be of a genial and equable temperature, at the same level, and gradually decreasing from below upwards to the ceiling.

That the ceiling be at a temperature differing very little from the stratum of air immediately below, and should be the lowest in the room.

That the range of temperature during the 24 hours be small, so as to prevent the loss of heat during the first part of the day, by heating air at a much lower temperature than is required.

That the water present in the air be such in amount that no undue checking or accelerating evaporation from the skin takes place.

That all heated air which passes upwards should pass away.

That fresh air be admitted to supply the place of the exhausted air.

That there should be a freedom from sensible currents of air, and a freedom from smoke.

On the other hand, we may consider that the reverse of these conditions is injurious to the health and comfort of the occupants, viz.:

That the general body of the air be either at too high or at too low a temperature.

That either the floor or walls be cold, with respect to the general temperature of the room.

That the ceilings be heated; unequal distribution of heat; bad ventilation; currents of air; presence of smoke.

If there be a great departure from the proper degree of humidity at any temperature, the air will be either too dry if at much less, or too damp if at much more, for healthy and agreeable respiration, and more particularly to all occupants who are in any way affected with pulmonary complaints.

Dependent upon the hygrometrical states of the air is the amount of vapour carried off from the lungs at every respiration, and given off by perspiration from the skin.

With a low dew-point at a high temperature of the air a large quantity of vapour is carried off from the lungs, and from perspiration; with a high dew-point the air will be a much less powerful absorbent of moisture, it will absorb less from the lungs; but at the same time the exhalations from the body may be greatly increased.

Excessive heat, moisture or dryness of the air, destroys its salubrity, and acts injuriously upon the animal system.

The general temperature of the air of an inhabited room differs but little with the season; it may be taken usually at about 60° in winter, and 65° in summer.

The amount of water which should be present in the air is dependent upon the temperature, and may be inferred from the following considerations.

Air, between the temperatures 30° and 70°, has its capacity for moisture doubled for an increase of less than 20° of temperature. At 30°, when saturated with moisture, it contains 2 grains in a cubic foot; at 41°, it contains 3 grains; at 49° it contains 4 grains, increases to 5 grains at 56°, to 6 grains at 66°, and to 7 grains at 70°. When therefore the air of the room is heated sufficiently, at times when the external atmosphere is at a low temperature, and consequently containing very little water in the invisible shape of vapour, the air of the apartment becomes very dry, and this extreme aridity causes a rapid absorption from the skin and lungs of occupants of the room; the loss of heat caused by this rapid evaporation contracts the blood-vessels at the surfaces, whilst other parts not exposed to the influence will be surcharged with the fluids driven from the extremities.

It is, therefore, absolutely necessary that water be present in the air to the amount of a little less than 3 grains at 50°, to 4 grains nearly at 60°, and to more than 5 grains at 70° in every cubic foot of air; and these amounts will be present when the wet-bulb thermometer reads about 45°, 54°, and 63°, respectively; when the dry-bulb thermometer reads 50°, 60°, and 70°, giving dew-points of 40°, 49° and 58°, successively; or a degree of humidity about 66, when complete saturation is represented by 100.

			Deg.
When a cubic foot of air is saturated with	2	grains of moisture, it is at the temperature of	30
Ditto - -	3	„ - „ - - „ - -	41
Ditto - -	4	„ - „ - - „ - -	49
Ditto - -	5	„ - „ - - „ - -	56
Ditto - -	6	„ - „ - - „ - -	61
Ditto - -	7	„ - „ - - „ - -	66
Ditto - -	8	„ - „ - - „ - -	70

And the actual amounts which should be present in a cubic foot of air at these temperatures to have the proper degree of moisture, are as follows:—

		Deg.
1·4	grains, at the temperature of - - -	30
2·0	„ - - „ - - - - -	41
2·7	„ - - „ - - - - -	49
3·4	„ - - „ - - - - -	56
4·0	„ - - „ - - - - -	61
4·7	„ - - „ - - - - -	66
5·3	„ - - „ - - - - -	70

Deg.		
Therefore at 30,	there should be 0·6 grain,	in a cubic foot short of saturation.
41 - - -	1·0	„ - - - „
49 - - -	1·3	„ - - - „
56 - - -	1·6	„ - - - „
61 - - -	2·0 grains	- - - „
66 - - -	2·3	„ - - - „
70 - - -	2·7	„ - - - „

And these are the quantities which each cubic foot of air will be able to absorb of the vapour given off from the skin and from the lungs. If we take this amount at 12 grains per minute for each occupant, then the vapour from the body will saturate under the above circumstances for each person:

	Deg.
20 cubic feet of air per minute - -	at 30
12 „ - - „ - - -	41
9 „ - - „ - - -	49
7½ „ - - „ - - -	56
6 „ - - „ - - -	60
5½ „ - - „ - - -	66
4½ „ - - „ - - -	70

If the air cannot escape at these several rates per minute, the additional quantity of vapour thus received will cause the degree of humidity to increase, supposing the temperature of the room to remain unchanged, and the air will become too damp, being one of the evils of defective ventilation.

In the first section of the experiments are included those relating to the temperature and humidity of the air in the Board-room; in the second section, those for the temperature of the walls; the third section includes those of the temperature of the air at different distances above the floor, and at different distances from the fire; and a concluding section with the temperature and humidity of the external atmosphere on those days, when experiments of any kind have been taken.

In the first section, under the head of dry thermometer, the temperature of the air is shown just before lighting the fire, and successively afterwards during the day; the numbers under wet-bulb should be, as before stated, about 5° at 45°; 6° at 60°, and 7° at 70°; and the temperature of the dew-point should be 10°, 11° and 12° below the temperature of the air at these three temperatures. Passing to the next column, the elasticity of the vapour is shown, and in the next column, the actual weight in grains of the vapour present in the air: the numbers in the next column show the amount of vapour which the air in its then state could absorb; and if 12 grains be divided by these values, the result will show the number of cubic feet of air per minute, saturated by the aqueous vapour expired in that time from each occupant. The degree of humidity is shown in the last column, and the moisture in the air may be considered as right when these numbers differ but little from 65 to 70; as being too damp when much greater, and too dry when much less.

By comparison of the same elements on the same days in the external atmosphere, the amount of internal temperature above external, and the excess of water present in the room, being the amount of water extracted from the walls; that due to the presence of the observers, &c., and the difference of humidity may be immediately inferred. The discussion of the experiments follow each section. The whole of these experiments and their discussion are deposited for reference in the archives of the General Board of Health.

By taking the daily means of the observations the following Table was formed:

BOARD ROOM.—*Arnott's* Stove.—Determination of the Mean Daily Temperature and Humidity of the Air.

Year, Month, and Day.	Situation of the Instruments.	Mean Reading of Thermometers.		Temperature of Dew-point.	Elastic Force of Vapour.	Weight of Vapour in a Cubic Foot of Air.	Short of Saturation.	Degree of Humidity.	Mean Temperature of Day of 24 Hours, External Air.	Excess of Mean Temperature of Air in Room over that of External Air.	Excess of Temperature of Air in Room over that of External Air.		Range of Temperature in 24 Hours.	Mean Reading of a Thermometer with its Bulb placed in contact with the Wall.
		Dry Bulb.	Wet Bulb.								Highest by Day.	Lowest by Night.		
1856:		*Deg.*	*Deg.*	*Deg.*	*In.*	*Grs.*	*Grs.*		*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	
Dec. - 16	Out of doors - - - -	34·8	33·4	31·1	·174	2·0	0·3	86	34·4	- - -	- -	- -	7·5	
	Centre of room, 6 feet from floor	53·9	48·2	42·6	·273	3·1	1·6	66	—	—	—	—	—	
	Near north wall - - -	49·7	44·4	38·7	·235	2·7	1·4	66	49·3	14·9	15·8	13·9	9·4	
	Near south wall - - -	50·1	44·5	38·5	·233	2·7	1·4	65	49·3	14·9	15·9	13·9	9·5	
	Near west wall - - -	50·5	44 9	39·0	·238	2·7	1·4	65	50·4	16·0	18·0	13·9	11·6	
Dec. - 17	Out of doors - - - -	36·5	34·7	32·1	·182	2·1	0·5	85	33·3	- - -	- -	- -	13·1	
	Centre of room, 6 feet from floor	50 8	45·6	40·3	·250	2·8	1·4	68	—	—	—	—	—	
	Near north wall - - -	48·9	43·5	37·7	·226	2·6	1·4	65	49·3	16·0	12·6	19·4	6·5	
	Near south wall - - -	49·4	43·8	37·8	·227	2·7	1·4	64	49·6	16·3	13 5	19·0	7·8	
	Near west wall - - -	49·5	44·0	38·1	·230	2·6	1·4	64	49·3	16·0	14·0	7·9	9·4	
Dec. - 18	Out of doors - - - -	46·4	45·3	44·1	·289	3·3	0·3	93	45·1	- - -	- -	- -	4·3	
	Centre of room, 6 feet from floor	54·8	50·2	45·8	·308	3·5	1·3	71	—	—	—	—	—	
	Near north wall - - -	52·7	47·9	43·1	·278	3·2	1·2	70	52·2	7·1	8·2	6·0	7·5	
	Near south wall - - -	53·1	48·3	43·5	·283	3·2	1·3	70	52·3	7·2	8·0	6·3	7 0	
	Near west wall - - -	53·8	48·7	43·7	·285	2·9	1·7	64	53·3	8·2	10·2	6·2	9·3	
Dec. - 19	Out of doors - - - -	40·7	38·0	34·6	·200	2·3	0·6	79	40·8	- - -	- -	- -	4·9	
	Centre of room, 6 feet from floor	55·7	49·9	44·4	·293	3·3	1·6	67	—	—	—	—	—	
	Near north wall - - -	53·6	49·6	45·7	·307	3·5	1·2	75	52·9	12·1	13·7	10·3	8·3	
	Near south wall - - -	52·1	47·7	43·2	·279	3·2	1·2	72	52·8	12·0	13·4	10·5	7·8	
	Near west wall - - -	54·4	48·4	42·6	·273	3·1	1·7	64	54·2	13·4	16·1	10·5	10·5	
Dec. - 20	Out of doors - - - -	46·0	44·5	42·8	·275	3·2	0·4	89	43·0	- - -	- -	- -	9·9	
	Centre of room, 6 feet from floor	56·4	51·2	46·4	·316	3 5	1·6	69	—	—	—	—	—	
	Near north wall - - -	54·2	48·8	43·5	·283	3·2	1·6	67	53·9	10·9	9·8	12·2	7·5	
	Near south wall - - -	56·0	50·5	45·4	·304	3·4	1·6	67	53·8	10 8	9·5	12·2	7·2	
	Near west wall - - -	54·9	49·5	44·3	·292	3·3	1·6	67	54·9	11·9	11·8	12·2	9·5	
														Deg.
Dec. - 22	Out of doors - - - -	45·4	42·6	39·4	·241	2·8	0·7	80	43·0	- - -	- -	- -	7·9	South of fire-place - - 54·5
	Centre of room, 6 feet from floor	55·3	50·3	45·6	·306	3·5	1·5	70	—	—	—	—	—	North of fire-place - - 56·1
	Near north wall - - -	53·4	48·2	43·0	·277	3·1	1·5	68	53·0	10·0	9·4	10·7	6·6	North wall - - - - 53·1
	Near south wall - - -	53·6	48·3	43·1	·278	3·1	1·5	68	53·0	10·0	9·4	10·6	6·7	West wall, near north end - 53·2
	Near west wall - - -	54·2	48·9	43·7	·285	3·3	1·5	67	54·0	11·0	11·5	10·6	8·8	West wall .near south end - 53·7

(*continued*)

BOARD ROOM.—*Arnott's* Stove.—Determination of the Mean Daily Temperature and Humidity of the Air—*continued.*

Year, Month, and Day.	Situation of the Instruments.	Mean Reading of Thermometers.		Temperature of Dew-point.	Elastic Force of Vapour.	Weight of Vapour in a Cubic Foot of Air.	Short of Saturation.	Degree of Humidity.	Mean Temperature of Day of 24 Hours, External Air.	Excess of Mean Temperature of Air in Room over that of External Air.	Excess of Temperature of Air in Room over that of External Air.		Range of Temperature in 24 Hours.	Mean Reading of a Thermometer with its Bulb placed in contact with the Wall.	
		Dry Bulb.	Wet Bulb.								Highest by Day.	Lowest by Night.			
		Deg.	*Deg.*	*Deg.*	*In.*	*Grs.*	*Grs.*		*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*		*Deg.*
1856: Dec. - 23	Out of doors - - - -	38·5	35·7	32·0	·181	2·1	0·7	78	38·8	- - -	- -	- -	3·1	South of fire-place - -	53·5
	Centre of room, 6 feet from floor	54·3	48·7	43·3	·280	3·2	1·6	66	—	—	—	—	—	North of fire-place - -	54·4
	Near north wall - - -	52·6	47·0	41·4	·261	2·9	1·5	66	52·7	13·9	15·6	12·1	6·6	North wall - - - -	51·9
	Near south wall - - -	52·8	47·0	41·2	·259	2·9	1·6	65	52·9	14·1	15·1	12·9	5·3	West wall, near north end -	52·0
	Near west wall - - -	53·5	47·7	41·9	·266	3·0	1·6	65	54·1	15·3	17·9	12·5	8·5	West wall, near south end -	52·6
Dec. - 24	Out of doors - - - -	40·4	38·5	36·0	·212	2·5	0·5	85	39·3	- - -	- -	- -	8·8	South of fire-place - -	52·9
	Centre of room, 6 feet from floor	53·9	48·3	42·8	·275	3·1	1·6	66	—	—	—	—	—	North of fire-place - -	54·5
	Near north wall - - -	52·2	46·2	40·1	·248	2·8	1·6	64	52·0	12·7	12·3	13·1	8·0	North wall - - - -	51·3
	Near west wall - - -	53·1	47·1	41·1	·258	2·9	1·6	64	53·3	14·0	14·3	13·7	9·4	West wall, near north end -	51·4
														West wall, near south end -	52·4
Dec. - 29	Out of doors - - - -	34·6	33·0	30·4	·170	2·0	0·3	84	29·5	- - -	- -	- -	14·9	South of fire-place - -	42·5
	Centre of room, 6 feet from floor	43·5	39·5	34·7	·201	2·3	0·9	72	—	—	—	—	—	North of fire-place - -	43·7
	Near north wall - - -	41·6	37·2	31·7	·179	2·1	1·0	68	41·1	11·6	9·1	13·9	10·1	North wall - - - -	40·6
	Near west wall - - -	42·3	37·7	32·1	·182	2·1	1·1	68	42·7	13·2	11·1	15·1	11·0	West wall, near north end -	40·6
														West wall, near south end -	41·6
Dec. - 30	Out of doors - - - -	43·8	42·6	41·1	·258	3·0	0·3	91	39·9	- - -	- -	- -	11·8	South of fire-place - -	46·0
	Centre of room, 6 feet from floor	47·2	43·8	40·0	·247	2·7	0·8	77	—	—	—	—	—	North of fire-place - -	49·1
	Near north wall - - -	45·5	41·8	37·5	·225	2·6	0·9	74	45·7	5·8	4·7	7·9	9·1	North wall - - - -	44·4
	Near west wall - - -	48·7	43·4	37·6	·225	2·6	1·8	68	47·0	7·1	7·0	7·0	11·3	West wall, near north end -	44·5
														West wall, near south end -	45·5
Dec. - 31	Out of doors - - - -	47·3	44·8	42·1	·268	3·1	0·6	83	46·0	- -	- -	- -	6·2	South of fire place - -	49·6
	Centre of room, 6 feet from floor	51·4	47·3	43·0	·277	3·2	1·1	74	—	—	—	—	—	North of fire-place - -	52·5
	Near north wall - - -	49·6	45·7	41·6	·263	2·9	1·1	74	46·9	0·9	3·3	- -	11·1	North wall - - - -	48·4
	Near west wall - - -	50·7	46·5	42·1	·268	3·1	1·1	73	48·1	2·1	5·8	0·4	12·6	West wall, near north end -	48·9
														West wall, near south end -	49·9

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Jan. - 2	Out of doors - - - -	45·6	42·2	38·2	·231	2·7	0·9	75	43·7	- - -	- -	- -	7·4	South of fire-place -	- 53·5
	Centre of room, 6 feet from floor	55·2	50·4	45·8	·308	3·5	1·4	71	—	—	—	—	—	North of fire-place -	- 55·2
														North wall - - -	- 52·6
	Near north wall - - -	53·4	48·7	44·0	·288	8·3	1·3	71	51·9	8·2	10·0	6·3	11·1	West wall, near north end	- 52·8
	Near west wall - - -	54·2	49·4	44·7	·296	3·4	1·4	70	53·3	9·6	12·3	6·8	12·9	West wall, near south end	- 54·7
Jan. - 3	Out of doors - - -	48·5	44·9	41·0	·257	2·9	1·0	75	45·5	- - -	- -	- -	9·3	South of fire-place -	- 53·6
	Centre of room, 6 feet from floor	55·1	50·2	45·5	·305	3·4	1·5	70	—	—	—	—	—	North of fire-place -	- 54·9
														North wall - - -	- 54·7
	Near north wall - - -	53·5	48·7	43·9	·287	3·2	1·4	70	53·1	7·6	7·8	7·4	9·7	West wall, near north end	- 54·7
	Near west wall - - -	54·8	49·2	44·2	·290	3·3	1·5	69	54·6	9·1	8·8	9·3	8·8	West wall, near south end	- 53·4
Jan. - 16	Out of doors - - - -	39·2	37·5	35·2	·205	2·4	0·4	86	88·4	- - -	- -	- -	11·4	South of fire-place -	- 50·5
	Centre of room, 6 feet from floor	52·4	47·6	42·7	·274	3·2	1·3	70	—	—	—	—	—	North of fire-place -	- 50·4
														North wall - - -	- 49·1
	Near north wall - - -	50·2	45·5	40·6	·253	2·9	1·2	70	48·4	10·0	8·5	11·6	8·3	West wall, near north end	- 48·4
	Near west wall - - -	51·0	45·5	39·8	·245	2·8	1·4	65	49·0	10·6	8·9	12·3	8·0	West wall, near south end	- 49·2
Jan. - 17	Out of doors - - - -	39·6	38·3	36·6	·217	2·5	0·3	89	37·6	- - -	- -	- -	9·8	South of fire-place -	- 49·2
	Centre of room, 6 feet from floor	49·9	45·7	41·3	·260	2·9	1·2	73	—	—	—	—	—	North of fire-place -	- 49·3
														North wall - - -	- 47·2
	Near north wall - - -	48·2	43·9	39·2	·239	2·8	1·1	71	47·8	10·2	8·7	11·6	6·9	West wall, near north end	- 47·1
	Near west wall - - -	48·7	44·1	39·1	·238	2·7	1·2	70	49·0	11·4	10·8	12·0	8·6	West wall, near south end	- 47·5
Jan. - 19	Out of doors - - - -	46·4	43·5	40·2	·249	2·9	0·8	80	43·1	- - -	- -	- -	10·2	South of fire-place -	- 52·2
	Centre of room, 6 feet from floor	54·8	50·0	45·4	·304	3·4	1·4	70	—	—	—	—	—	North of fire-place -	- 53·2
														North wall - - -	- 51·1
	Near north wall - - -	51·9	48·0	44·1	·289	3·3	1·0	75	49·7	6·6	6·8	6·3	10·7	West wall, near north end	- 51·0
	Near west wall - - -	53·6	4	43·3	·280	3·1	1·5	68	50·9	7·8	8·9	6·7	12·4	West wall, near south end	- 51·5

BOARD ROOM.—*Arnott's* Stove.

Discussion of the mean daily Results of Experiments, for the Determination of the Temperature and Humidity of the Air at different parts of the Board Room.

Dec. 16. Arnott's Stove.—With a maximum temperature, out of doors, of 38°, the temperature in the room rose to 56°, and with a minimum of 30°·7, it fell to 44°·6 in the room. The mean temperature for the 24 hours was 34°·4 out of doors; and was from 15° to 16° higher in the room.

The mean temperature out of doors during the period of the day observations was 34°·8, and at the centre of the room was 19°·1 higher; near the north wall it was lower than in the centre of the room by 4°·2; near the south wall by 3°·8, and near the west wall by 3°·4.

The mean reading of the wet-bulb out of doors was 33°·4, and in the room was 14°·8 higher; near the north wall it was 3°·8, and near the south wall 3°·7; the west wall was 3°·3 lower than in the centre of the room. The mean temperature of the dew-point, out of doors, was 31°·1; and in the centre of the room was 11°·5 higher, and near the walls, from 3°·6 to 4°·1 below that in the centre of room. Out of doors, in a mass of air one cubic foot in extent, there were 2 grains of water, and in the room, in the same mass, there was 1·1 grain additional, being still 1½ grain nearly short of saturation, and the degree of humidity was 20 less at all parts of the room, than out of doors, where it was 86.

Dec. 17. Arnott's Stove.—With a maximum temperature, out of doors, of 40°, the temperature in the room rose to 54°; and with a minimum temperature of 26°·7 out of doors, it fell to 44°·6 in the room. The mean temperature for the 24 hours was 33°·3 out of doors, and was about 16° higher in the room.

The mean temperature, out of doors, during the day observations, was 36°·5; at the centre of the room it was 14°·3 higher; near the north wall it was lower than in centre of room by 1°·9; near the south wall by 1°·4; and near the west wall by 1°·3.

The mean reading of the wet-bulb out of doors was 34°·7, and in the room was 10°·9 higher; near the north wall it was 2°·1; near the south wall 1°·8; and near the west was 1°·6 lower than in the centre of the room. The mean dew-point temperature, out of doors, was 32°·1, and in the centre of the room was 8°·2 higher; and near the walls it varied from 2°·2 to 2°·6 below that in the centre of the room. In a mass of external air, 1 cubic foot in extent, there were 2·1 grains of water; whilst in the same mass in the room there was 0·7 grain additional, which was still about 1¼ grain short of saturation, and the degree of humidity was from 17 to 21 less in the room than out of doors, where it was 85.

Dec. 18. Arnott's Stove.--The maximum temperature in external air was 47°·8, and that in the room rose to 58°·0; the minimum out of doors was 42°·5, and that in the room was 48°·6. The mean temperature for the 24 hours was 45°·1 out of doors; and was from 7° to 8° in excess in the room.

The mean external temperature during the period of the day observations was 46°·4; at the centre of the room the mean temperature was 8°·4 in excess; near the north wall it was 2°·1, near the south wall 1°·7, and near the west wall 1°·0 lower than in the centre of the room.

The mean reading of the wet-bulb, out of doors, was 45°·3, and in the centre of the room was 4°·9 higher; and near the walls it varied from 1°·5 to 2°·3 below the centre of the room. The mean dew-point temperature, out of doors, was 44°·1; in the centre of the room it was 1°.7 higher; and near the walls it varied from 2°·1 to 2°·7 lower than in the centre of the room. There was an excess of 0·2 grain only of water in the room, in a cubic foot of air, over that in external air, being about 1¼ grain short of saturation, and the degree of humidity varied from 22 to 29 less in the room, than in the external air, where it was 93.

Dec. 19. Arnott's Stove.—With a maximum temperature in external air of 43°·3, the temperature in the room rose to 54°·4; and with a minimum of 38°·4 in external air, it fell to 48°·7 in the room. The mean temperature for the 24 hours was 40°·8 out of doors, and was from 12° to 13° higher in the room.

The mean external temperature during the day observations was 40°·7; it was 15° higher in the centre of room; and near the north wall it was 2°·1, near the south wall 3°·6, and near the west wall 1°·3 lower than in the centre of the room.

The mean reading of the wet-bulb, in external air, was 38·0, and in the centre of the room 11°·9 in excess; and varied from 0°·3 to 2°·2 lower, near the walls, than in the centre of the room. The mean temperature of the dew-point out of doors was 34°·6; and in the centre of the room was 9°·8 higher; and near the walls varied from 1°·2 to 1°·8 lower than in the centre of the room. Water was 0·3 grain in excess in a cubic foot of air in the centre of the room, over that in the same mass of external air, and was nearly ½ a grain short of saturation; and the degree of humidity in the room varied from 4 to 15 below that in the external air, which was 79.

Dec. 20. Arnott's Stove.—The out of doors temperature rose to 47°·9, and that in the room to 59°·7; and fell to 38°·0 out of doors and to 50°·2 in the room. The mean temperature for the 24 hours was 43°·0, and was about 11° or 12° higher in the room.

The mean temperature during the period of the day observations was 46° in external air; at the centre of the room it was 10°·4 higher. Near the north wall it was lower than in the centre of the room by 2°·2; near the south wall by 0°·4; and near the west wall by 1°·5.

The mean reading of the wet-bulb thermometer, out of doors, was 44°·5; and in the room was 6°·7 in excess; and near the north wall it was 2°·4; the south wall 0°·4; and the west wall 1°·7 lower than in the centre of the room. The mean dew-point temperature was 42°·8 in external air; in the centre of the room it was 3°·6 higher; and at the walls from 1°·0 to 2°·9 lower than in the centre of the room. In the centre of the room there was 0·7 grain in a cubic foot of air more water than in the same mass out of doors, being still something more than 1½ grain short of saturation. The degree of humidity was about 20 less in the room than in external air, which was 89.

Dec. 22. Arnott's Stove.—With a maximum temperature of 46°·9 in the external air, that in the room rose to 58°·4; and with a minimum of 39°·0 out of doors, it fell to 49°·6 in the room. The mean temperature for the 24 hours was 43°, and was from 10° to 11° higher in the room. The mean temperature during the period of the day observations was 45°·4 out of doors, and was 9°·9 higher in the centre of the room; near the north wall it was lower than in the centre of the room by 1°·9; near the south wall by 1°·7; and near the west wall by 1°·1. At the east wall, north of fire-place, it was 0°·8 above; south of fire-place was 0°·8 below; and from 1°·6 to 2°·2 below at the north and west walls. The mean reading of the wet-bulb, out of doors, was 42°·6, being 7°·7 lower than in the centre of the room; whilst near the north wall it was 2°·1; the south wall 2°·0; and the west wall 1°·4 below that in the centre of the room. The mean temperature of the dew-point was 39°·4 in external air, and was 6°·2 lower than that in the centre of the room; and near the walls it was from 1°·9 to 2°·6 lower than the centre of the room. The excess of water was 0·7 grain in a cubic foot of air more in the centre of the room than in the external air, and was 1½ grain short of saturation. The degree of humidity varied from 10 to 13 in the room less than in the external air, which was 80.

Dec. 23. Arnott's Stove.—The temperature in external air rose to 40°·4, and that in the room to 58°·3; and fell in external air to 37°·3 and in the room to 49°·4. The mean temperature for the 24 hours was 38°·8 out of doors, being from 14° to 15° below that in the room.

The mean temperature during the period of the day observations was 38°·5 in external air; at the centre of the room it was 15°·8 higher; and near the north wall it was 1°·7, the south wall 1·5°, and the west wall 0°·8 lower than in the centre of the room. At the east wall, north of fire-place, it was 0°·1 above; south of fire-place it was 0°·8 below; and from 1°·7 to 2°·4 below at the north and west walls.

The mean reading of the wet-bulb, out-of-doors, was 35°·7, being 13° below that in the centre of the room; near the north and south walls it was 1°·7, and near the west wall 1°·0 lower than at the centre of the room. The mean temperature of the dew-point was 32°·0 in external air, and was 11°·3 higher in the centre of the room; whilst near the walls it was from 1°·4 to 2°·1 lower than at the centre of the room. In a cubic foot of air, out of doors, there were 2·1 grains of water, and in the centre of the room there was 1·1 grain additional, being still short of saturation by 1½ grain. The degree of humidity was about 12 less than out of doors, which was 78.

Dec. 24. Arnott's Stove.—With a maximum temperature of 43°·7 out of doors, the temperature in the room rose to 58°·0; and with a minimum of 34°·9 out of doors, it fell to 48°·0. The mean temperature of the 24 hours was 39°·3, being from 13° to 14° higher in the room.

During the day observations the mean temperature was 40°·4 in external air; at the centre of the room it was 13°·5 higher; and near the north wall it was 1°·7; and near the west wall, 0°·8 lower than in the centre of the room. At the east wall, north of fire-place, it was 0°·6 higher; south of fire-place it was 1°·0 lower; and at the north and west walls, from 1°·5 to 2°·6 lower. The mean reading of the wet-bulb was 38°·5 in external air, being 9°·8 lower than in the centre of the room; and near the north and west walls it was respectively 2°·1 and 1°·2 lower than the centre of the room. The mean dew-point temperature was 36°·0 out of doors, and 6°·8 higher in the centre of the room; and near the walls it varied from 1°·7 to 2°·7 lower than in the centre of the room. Something more than ½ a grain of water in a cubic foot of air was in excess in the centre of the room over the same mass of external air, the room being 1½ grains short of saturation. The degree of humidity was about 20 less than that in external air, which was 85.

Dec. 29. Arnott's Stove.—The temperature rose to 37°·0 out of doors, and in the room to 48°·2; and it fell to 22°·1 out of doors, and to 36°·0 in the room. The mean temperature of the 24 hours was 29°·5 out of doors, and in the room from 11°½ to 13° higher.

The mean temperature during the day observations was 34°·6 out of doors, and in the centre of the room was 8°·9 higher; and near the north and west walls it was respectively 1°·9 and 1°·2 lower than at the centre of the room. At the east wall, north of fire-place, it was 0°·2 above; south of fire-place, 1°·0 below; and at the north and west walls from 1°·9 to 2°·9 below. The mean reading of the wet-bulb thermometer was 33°·0 out of doors, and in the centre of the room was 6°·5 in excess; and near the north wall it was 2°·3, and the south wall 1°·8 lower than in the centre of the room. The mean temperature of the dew-point was 30°·4 in external air, and in the centre of the room was 4°·3 higher; whilst near the walls it varied from 2°·6 to 3°·0 lower than in the centre of the room. Water was present to the extent of 2 grains in a cubic foot of external air, and was 0·3 grain in excess in the same mass at the centre of the room, which was about 1 grain short of saturation. The degree of humidity was from 12 to 16 less than in external air, which was 84.

Dec. 30. Arnott's Stove.—The maximum temperature, out of doors, was 45°·6, and that in the room 52°·6; the minimum out of doors, was 34°·3, and in the room 41°·2. The mean temperature for the 24 hours was 39°·9, being from 6° to 7° lower than in the room.

The mean temperature during the period of the day observations was 43°·8 in external air; at the centre of the room it was 3°·4 higher; and near the north and west walls it was respectively 1°·7 lower, and 1°·5 higher than at the centre of the room. At the east wall, north of fire-place, it was 1°·9 above; south of fire-place, it was 1°·2 below; and at the north and west walls it was from 1°·7 to 2°·7 below. The mean reading of the wet-bulb was 42°·6 in external air, and at the centre of the room it was but 1°·2 higher; and near the north wall it was 2°·0, and the south wall 0°·4 lower than at the centre of the room. The dew-point temperature was 41°·1 out of doors, and at the centre of the room it was 1°·1 lower; and near the walls from 2°·4 to 2°·5 lower than at the centre of the room. Water was less prevalent in the room than in the external air, by 0·3 grains in a cubic foot of air, that in the room being nearly 1

1 grain short of saturation. The degree of humidity was from 14 to 23 less in the room than in the external air, which was 91.

Dec. 31. Arnott's Stove.—With a maximum temperature of 49°·1 out of doors, the temperature of the room rose to 54°·9; and with a minimum of 42°·9 out of doors, it fell to 41°·3 in the room. The mean temperature for the 24 hours was 46°·0 out of doors, being from 1° to 2° lower than the air of the room.

The mean temperature during the day observations was 47°·3 out of doors, and in the centre of the room 4°·1 in excess; and near the north and west walls it was respectively 1°·8 and 0°·7 lower than in the centre of the room. At the east wall, north of fire-place, it was 1°·1 higher; south of fire-place, it was 1°·8 lower; and at the north and west walls, from 1°·5 to 3°·0 lower. The mean reading of the wet-bulb was 44°·8 in external air, and in the centre of the room it was 2°·5 higher; and near the walls from 0°·8 to 1°·6 lower than in the centre of the room. The dew-point temperature was 42°·1 out of doors, being lower by 0°·9 than in the centre of the room, which was from 0°·9 to 1°·4 higher than near the walls. Water was to a very slight extent in excess in the centre of the room over that of external air, being about 1 grain short of saturation in the room; and the degree of humidity was about 9 less than that out of doors, which was 83.

Jan. 2. Arnott's Stove.—With a maximum temperature of 47°·4 out of doors, the temperature rose to 59°·7 in the room; and with a minimum of 40°·0 out of doors, it fell to 46°·3 in the room. The mean temperature for the 24 hours was 43°·7 in external air, being from 8° to 9° lower than in the room.

The mean temperature during the period of observation was 45°·6 out of doors, and in the centre of room 9°·6 in excess; and near the north wall it was 1°·8, and at the west wall 1°·0 lower than at the centre of the room. At the east wall, north of fire-place, it was of the same temperature; south of fire-place it was 1°·7 lower; and at the north and west walls from 0°·5 to 2°·6 lower.

The mean reading of the wet-bulb was 42°·2 in external air, and at the centre of the room it was 8°·2 higher; whilst it was lower than in the centre of the room near the north and west walls by 1°·7 and 1°·0 respectively. The mean temperature of the dew-point was 38°·2 out of doors, and in the centre of the room 7°·6 higher; and near the walls it was from 1°·1 to 1°·8 lower than at the centre of the room. Water to the extent of 0°·8 grain was in excess in the room over that in external air, being nearly 1½ grain short of saturation in the room; and the degree of humidity was only 4 less in the room than that in the external air, which was 75.

Jan. 3. Arnott's Stove.—The temperature of external air rose to 50°·2, and that in the room to 59°·0; and it fell to 40°·9 in the external air, and to 48°·3 in the room. The mean temperature for the 24 hours was 45°·5, that in the room being from 7° to 9° higher.

The mean temperature during the period of observation was 48°·5 out of doors, and in the centre of room was 6°·6 in excess; and it was lower than in the centre of the room by 1°·6 near the north, and 0°·8 near the west wall. At the east wall, north of fire-place, it was 0°·2 lower, and on the south of fire-place 1°·5 lower; and at the north and west walls from 0°·4 to 0°·7 lower.

The mean reading of the wet-bulb was 44°·9 out of doors, and in the centre of the room it was 5°·3 higher; and near the walls it was from 1°·0 to 1°·5 below the centre of the room. The mean temperature of the dew-point was 41°·0 in external air, and at the centre of the room it was 4°·5 higher; and near the walls it was lower than at the centre of room by 1°·3 to 1°·6. There was half a grain more water present in a cubic foot of air at the centre of room, which was 1½ grain short of saturation, than in the same mass of external air. The degree of humidity was 5 less in the room than in the external air, which was 75.

Jan. 16. Arnott's Stove.—With a maximum temperature of 44°·1 in external air, the temperature in the room rose to 53°·0; and with a minimum of 32°·7 in the external air, it fell to 44°·3 in the room. The mean temperature for the 24 hours was 38°·4; and was from 10° to 11° higher in the room.

The mean temperature during the experiments was 39°·2 out of doors, and in the centre of the room was 13°·2 higher; and near the walls it was 2°·2 near the north wall, and 1°·4 near the south wall, lower than in the centre of room. At the east wall, north of fire-place, it was 2°·0 lower, and at the south of fire-place it was 1°·9 lower; and at the north and west walls from 3°·2 to 4°·0 lower.

The mean reading of the wet-bulb was 37°·5 in external air, and 10°·1 higher in the centre of the room; whilst near the walls it was 2°·1 lower than at the centre of the room. The mean dew-point temperature was 35°·2 out of doors, and 7°·5 higher in the centre of the room, which was from 2°·1 to 2°·9 higher than near the walls. The amount of water in a cubic foot of external air was 2·4 grains, and in the centre of the room there was 0·8 grain additional in the same mass, being about 1¼ grain short of saturation; and the degree of humidity varied from 16 to 21 less in the room than in the external air, which was 86.

Jan. 17. Arnott's Stove.—The temperature of external air rose to 42°·5, and that in the room to 53°·3; and fell to 32°·7, whilst that in the room fell to 44°·3. The mean temperature for the 24 hours was 37°·6; and was from 10° to 11° higher in the room.

The mean temperature during the experiments was 39°·6 in external air, and in the centre of the room 10°·3 higher; and near the north and west walls it was 1°·7 and 1°·2 respectively lower than at the centre of the room. At the east wall, north of fire-place, it was 0°·6, and at the south of fire-place 0°·7 lower; and at the north and west walls, from 2°·4 to 2°·7 lower.

The mean reading of the wet-bulb was 38°·3 out of doors, being 7°·4 lower than in the centre of the room, which was from 1°·6 to 1°·8 higher than near the walls. The mean dew-point temperature in external air was 36°·6, being 4°·7 lower than in the centre of the room, which was from 2°·1 to 2°·2 higher than near the walls. The excess of water in the centre of the room over that of external air, was 0·4 grains in a cubic foot of air, that in the room being about 1¼ grain short of saturation; and the degree of humidity was from 16 to 19 less in the room than that in the external air, which was 89.

Jan. 19. Arnott's Stove.—With a maximum temperature of 49°·0 out of doors, the temperature in the room rose to 57°·1; and with a minimum of 40°·1 in external air, it fell to 44°·3 in the room. The mean temperature for the 24 hours was 43°·1, and was from 6°½ to 7°½ higher in the room.

The mean temperature of the room during the period of experiments was 46°·4 out of doors, and in the centre of the room was 8°·4 in excess; whilst near the north and west walls it was 2°·9 and 1°·2 respectively lower than at the centre of the room. At the east wall, north of fire-place, it was 1°·6; and south of fire-place 2°·6 lower; and at the north and west walls from 3°·3 to 3°·8 lower. The mean reading of the wet-bulb was 43°·5 out of doors, and in the centre of the room it was 6°·5 in excess; and near the north and west walls it was 2°·0 and 1°·6 respectively lower than at the centre of the room. The mean temperature of the dew-point was 40°·2 out of doors, and in the centre of the room 5°·2 in excess; and near the walls it varied from 1°·3 to 2°·1 lower than in the centre of the room. There was an excess of ½ a grain of water in a cubic foot of air at the centre of the room, which was nearly 1½ grains short of saturation, over that in external air; and the degree of humidity was from 5 to 12 less in the room than that out of doors, which was 80.

By taking the means of the daily experiments when Leslie's stove was used, the next Table was formed.

Board Room.—*Leslie's* Stove on the Ground.—Determination of the Mean Daily Temperature and Humidity of the Air.

Year, Month, and Day.	Situation of the Instruments.	Mean Reading of Thermometers.		Temperature of Dew-point.	Elastic Force of Vapour.	Weight of Vapour in a Cubic Foot of Air.	Short of Saturation.	Degree of Humidity.	Mean Temperature of Day of 24 Hours.	Excess of Mean Temperature of Air in Room over that of External Air.	Excess of Temperature of Air in Room over that of External Air.		Range of Temperature in 24 Hours.	Mean Reading of a Thermometer with its Bulb placed in contact with the Wall.	
		Dry Bulb.	Wet Bulb.								Highest by Day.	Lowest by Night.			
1857:		Deg.	Deg.	Deg.	In.	Grs.	Grs.		Deg.	Deg.	Deg.	Deg.	Deg.		Deg.
Jan. - 29	Out of doors - - - - -	28·7	27·9	24·7	·133	1·6	0·3	83	27·3	- - -	- -	- -	8·3	South of fire-place - -	44·7
	Centre of room, 6 feet from floor	45·2	40·5	35·1	·204	2·3	1·1	68	—	—	—	—	—	North of fire-place - -	44·1
	North wall - - - - -	44·4	38·6	31·8	·179	2·0	1·3	61	42·4	15·1	13·4	16·7	5·0	North wall - - - -	42·3
	West wall - - - - -	43·6	38·4	32·2	·182	2·1	1·1	63	41·8	14·5	16·0	12·8	11·5	West wall, near north end -	41·9
Jan. - 30	Out of doors - - - - -	30·2	29·0	25·0	·135	1·6	0·3	81	27·5	- - -	- -	- -	12·2	South of fire-place - -	43·9
	Centre of room, 6 feet from floor	49·9	40·5	35·4	·207	2·4	0·9	69	—	—	—	—	—	North of fire-place - -	43·5
	North wall - - - - -	42·8	38·3	32·8	·186	2·1	0·8	80	41·8	14·3	13·8	14·9	11·1	North wall - - - -	41·7
	West wall - - - - -	42·9	37·8	31·6	·178	2·0	1·1	65	41·2	13·7	14·8	12·6	14·4	West wall, near north end -	40·9
Jan. - 31	Out of doors - - - - -	34·7	33·4	31·3	·176	2·1	0·3	87	34·2	- - -	- -	- -	5·2	South of fire-place - -	45·5
	Centre of room, 6 feet from floor	46·9	43·2	39·0	·233	2·7	0·9	75	—	—	—	—	—	North of fire-place - -	47·3
	North wall - - - - -	44·9	40·9	36·2	·214	2·4	0·9	71	43·9	9·7	13·3	6·2	12·3	North wall - - - -	43·6
	West wall - - - - -	45·1	40·6	35·3	·206	2·4	1·0	69	43·7	9·5	13·4	5·6	13·0	West wall, near north end -	43·1
Feb. - 2	Out of doors - - - - -	33·3	31·7	28·7	·158	1·8	0·4	83	29·8	- - -	- -	- -	13·2	South of fire-place - -	43·0
	Centre of room, 6 feet from floor	43·7	39·8	35·1	·204	2·3	0·9	72	—	—	—	—	—	North of fire-place - -	44·6
	North wall - - - - -	42·1	38 0	38·0	·188	2·1	0·9	71	40·9	11·1	10·3	11·8	11·7	North wall - - - -	41·1
	West wall - - - - -	42·1	37·8	3· 5	·184	2·2	0·9	70	41·5	11·7	11·7	11·6	13·3	West wall, near north end -	40 5

Board Room.—Leslie's Stove on the Ground.

Discussion of the Daily Results of the Experiments for the Determination of the Temperature and Humidity of the Air at different parts of the Board Room.

Jan. 29. Leslie's Stove on the ground.—The temperature out of doors rose to 31°·5; in the room to 47°·5; fell to 23°·2 out of doors, and in the room to 36°·0. The mean temperature for the 24 hours was 27°·3, and was from 14° to 15° higher in the room.

The mean temperature during the experiments was 28°·7 out of doors, and 16°·5 higher in the centre of the room; and near the north and west walls it was 0°·8 and 1°·6 respectively lower than at the centre of the room. At the east wall, north of fire-place, it was 1°·1; and south of fire-place 0°·5 lower; and at the north and west walls from 2°·9 to 3°·3 lower. The mean reading of the wet-bulb was 27°·9 in external air, and in the centre of the room was 12°·6 higher; and near the north wall it was 1°·9, and near the south wall 2°·1 lower than at the centre of the room. The mean dew-point temperature was 24°·7 in the external air, and at the centre of the room was 10°·4 in excess; near the walls it varied from 2°·9 to 3°·3 below the centre of the room. Water was present to the amount of 1·6 grain in a cubic foot of external air; and in the same mass, at the centre of the room, 0·7 grain additional was present, being still 1 grain short of saturation; and the degree of humidity varied from 15 to 22 less in the room than in the external air, which was 83.

Jan. 30. Leslie's Stove on the ground.—With a maximum temperature of 33°·6 in external air, the temperature in the room rose to 48°·4; and with a minimum of 21°·4 out of doors, it fell to 34°·0 in the room. The mean temperature for the 24 hours was 27°·5 out of doors, and was about 14° higher in the room.

During the period of experiments the mean temperature of external air was 30°·2, and in the centre of the room was 19°·7 in excess; and near the walls it was near the north wall 7°·1, and near the west wall 7°·0 lower than in the centre of the room. At the east wall, north of fire-place, it was 6°·4; and south of fire-place 6°·0 lower; and at the north and west walls, from 8°·2 to 9°·0 lower.

The reading of the wet-bulb was 29°·0 in external air, and was 11°·5 higher at the centre of the room; near the north wall it was 2°·2, and near the west wall 2°·7 lower than at the centre of the room. The mean temperature of the dew-point was 25°·0 in external air, and at the centre of room was 11°·5 in excess; near the walls it being from 2°·6 to 3°·8 lower than at the centre of the room. About ½ a grain of water in a cubic foot of air was in excess in the room, which was nearly 1 grain short of saturation over that in external air. The degree of humidity varied from 1 at the north wall to 16 at the west wall less than in external air, which was 81.

Jan. 31. Leslie's Stove on the ground.—With a maximum temperature of 36°·8 out of doors, the temperature in the room rose to 50°·2; it fell to 31°·6 out of doors, and in the room to 37°·2. The mean temperature for the 24 hours was 34°·2, and was between 9° and 10° higher in the room.

The mean temperature during the period of experiments was 34°·7 out of doors, and in the centre of the room was 12°·2 in excess; near the north and west walls it was 2°, and 1°·8 respectively lower than at the centre of the room. At the east wall, north of fire-place, it was 0°·4 above; and south of fire-place 1°·4 lower; and at the north and west walls from 3°·3 to 3°·8 lower.

The mean reading of the wet bulb was 33°·4 out of doors, and in the centre of the room was 9°·8 in excess; and near the walls it was from 2°·3 to 2°·6 lower than at the centre of the room. The mean dew-point temperature was 31°·3 in external air, and 7°·7 higher in the centre of the room; and near the walls it was from 2°·8 to 3°·7 lower than in the centre of the room. Water was present to the amount of 2·1 grains in a cubic foot of external air; and in the same mass at the centre of the room, there was an excess of about half a grain, being nearly 1 grain short of saturation. The degree of humidity was from 12 to 18 less in the room than that in the external air, where it was 87.

Feb. 2. Leslie's Stove on the ground.—The temperature rose to 36°·4 out of doors, and to 48°·1 in the room; and fell to 23°·2 out of doors, and to 34°·8 in the room. The mean temperature for the 24 hours was 29°·8, and was about 11° in excess in the room.

The mean temperature during the experiments was 33°·3 in external air, and in the centre of the room was 10°·4 higher; near the walls it was 1°·6 lower than in the centre of the room. At the east wall, north of fire-place, it was 0°·9 higher, and south of fire-place 0°·7 lower; and at the north and west walls from 2°·6 to 3°·2 lower.

The mean reading of the wet-bulb was 31°·7 in external air, and was 8°·1 higher in the centre of room; near the walls was from 1°·8 to 2° lower than at the centre of the room. The mean temperature of the dew-point was 28°·7 in external air, and 6°·4 higher in the centre of the room; and it was from 2°·1 to 2°·6 higher in the centre of room than near the walls. There was half a grain more water present in a cubic foot of air at the centre of room, which was nearly 1 grain short of saturation; and the degree of humidity varied from 11 to 13 less in the room than in the external air, where it was 83.

By taking the means of the daily experiments when Leslie's stove was raised above the floor the next Table was formed.

Board Room.—*Leslie's* Stove raised 6·5 Inches above the Floor.—Determination of the Mean Daily Temperature and Humidity of the Air.

Year, Month, and Day.	Situation of the Instruments.	Mean Reading of Thermometers.		Temperature of Dew Point.	Elastic Force of Vapour.	Weight of Vapour in a Cubic Foot of Air.	Short of Saturation.	Degree of Humidity.	Mean Temperature of Day of 24 Hours.	Mean Reading of a Thermometer with its Bulb placed in contact with the Wall.	
		Dry Bulb.	Wet Bulb.								
1857:		*Deg.*	*Deg.*	*Deg.*	*In.*	*Grs.*	*Grs.*		*Deg.*		*Deg.*
Feb. - 13	Out of doors	40·4	38·0	35·1	·204	2·3	0·6	81	38·6	South of fire-place	50·9
	Centre of room, 6 feet from floor	51·7	46·9	41·9	·266	3·0	1·3	69	—	North of fire place	53·8
										North wall	49·3
										West wall, near north end	49·2
										West wall, near south end	49·8
Feb. - 14	Out of doors	41·0	38·2	34·7	·201	2·3	0·6	79	38·5	South of fire-place	51·8
	Centre of room, 6 feet from floor	52·8	47.8	42·7	·274	3·0	1·3	69	—	North of fire-place	54·2
										North wall	50·1
										West wall, near north end	50·0
										West wall, near south end	50·4
Feb. - 16	Out of doors	45·4	42·1	38·3	·232	2·7	0·8	77	40·8	South of fire-place	50·2
	Centre of room, 6 feet from floor	51·1	46·6	41·9	·266	3·0	1·4	65	—	North of fire-place	53·0
										North wall	47·9
										West wall, near north end	47·9
										West wall, near south end	48·0
Feb. - 18	Out of doors	48.2	45·8	43·1	·278	3·2	0·7	83	—	South of fire-place	54·2
	Centre of room, 6 feet from floor	55·8	51·2	46·9	·322	3·6	1·6	67	—	North of fire-place	57·9
										North wall	52·8
										West wall, near north end	53·1
										West wall, near south end	53·1
Feb. - 19	Out of doors	45·7	42·9	39·7	·246	2·8	0·7	80	44·8	South of fire-place	54·9
	Centre of room, 6 feet from floor	55·6	50·9	46·5	·317	3·6	1·4	71	—	North of fire-place	58·5
										North wall	53·3
										West wall, near north end	53·6
										West wall, near south end	53·8
Feb. - 20	Out of doors	46·5	43·3	39·8	·245	2·8	0·8	78	45.0	South of fire-place	55·9
	Centre of room, 6 feet from floor	576	52·2	47·3	·327	3·7	1·6	68	—	North of fire-place	58·7
										North wall	54·6
										West wall, near north end	54·5
										West wall, near south end	54·5
Feb. - 21	Out of doors	46·1	43·3	40·1	·249	2·9	0·7	81	44·2	South of fire-place	55·7
	Centre of room, 6 feet from floor	56·7	51·4	46·5	·317	3·5	1·5	68	—	North of fire-place	58·5
										North wall	54·3
										West wall, near north end	54·5
										West wall, near south end	54·2

BOARD ROOM.—LESLIE'S STOVE RAISED 6·5 INCHES.

Discussion of the mean Daily Results of the Experiments for the Determination of the Temperature and Humidity of the Air at different parts of the Board Room.

Feb. 13. Leslie's Stove raised 6·5 inches.—The mean temperature for the 24 hours was 38°·6 in external air; and that during the period of observations was 40°·4, being 11°·3 higher in the centre of room; at the east wall, north of fire-place, it was 2°·1 higher; and south of fire-place 0°·8 lower; and at the north and west walls, from 1°·9 to 2°·5 lower than in the centre of the room. The wet-bulb thermometer read 38°·0 out of doors, and in the centre of the room was 8°·9 in excess. The dew-point mean temperature was 35°·1 in external air, and was 6°·8 in excess in the centre of the room. Water was in excess in the room by 0·7 grain in a cubic foot of air. The degree of humidity was 12 less in the room than in the external air, which was 81.

Feb. 14. Leslie's Stove raised.—The mean temperature for the 24 hours was 38°·5, and during the period of observations was 41°·0, being 11°·8 lower than in the centre of the room. The mean reading of the wet-bulb was 38°·2 out of doors, and 9°·6 in excess in the centre of the room. The mean dew-point temperature in external air was 34°·7, and in the centre of the room was 8°·0 in excess. The water in a cubic foot of air was in excess in the room by 0·7 grain, being 1¼ grain short of saturation, and the degree of humidity was 10 less in the centre of the room than in the external air.

Feb. 16. Leslie's Stove raised.—The mean temperature for the 24 hours was 40°·8, and that during the period of experiments was 45°·4, the centre of the room being 5°·7 in excess only. At the east wall, north of fire-place, it was 1°·9 higher; and south of fire-place, 0°·9 lower; and at the north and west walls, from 3°·1 to 3°·2 lower than in the centre of the room. The mean reading of the wet bulb thermometer out of doors was 42°·1, and was 4°·5 higher in the centre of the room. The mean external temperature of the dew-point was 38°·3, and the centre of the room was 3°·6 higher. About ¼ of a grain only of water in a cubic foot of air was in excess in the room, being still nearly 1½ grain short of saturation; and the degree of humidity was 12 less than in the external air.

Feb. 18. Leslie's Stove raised.—The mean temperature during the period of experiments was 48°·2 out of doors, that in the centre of room being 7°·6 in excess. At the east wall, north of fire-place, it was 1°·9 higher; and south of fire-place, 1°·6 lower; and at the north and west walls, from 2°·7 to 3°·0 lower than in the centre of the room. The mean reading of the wet-bulb thermometer, out of doors, was 45°·8, the excess in the centre of the room being 5°·4; the mean temperature of the dew-point was 43°·1 out of doors, and 3°·8 in excess in the centre of the room. There were 3·2 grains of water present in a cubic foot of external air; the excess in the room was 0°·4 grain, which was still 1½ grain short of saturation; and the degree of humidity was 16 less in the room than in the external air.

Feb. 19. Leslie's Stove raised.—For the 24 hours the mean temperature was 44°·8, and during the period of experiments it was 45°·7 out of doors; in the centre of the room it was 9°·9 higher. At the east wall, north of fire-place, it was 1°·9 higher, and south of fire-place 0°·7 lower; and at the north and west walls from 1°·8 to 2°·3 lower than in the centre of the room. The mean reading of the wet-bulb thermometer was 42°·9 out of doors, and in the centre of the room was 8° in excess. The mean dew-point temperature was 6°·8 in excess in the centre of the room over that in external air, which was 39°·7. Water to the extent of 0·8 grain in a cubic foot of air was in excess in the room, being nearly

1½ grain short of saturation; and the degree of humidity, which in the external air was 80, was 9 less in the room.

Feb. 20. Leslie's Stove raised.—The mean temperature for the 24 hours was 45°·0 in the external air, and was 46°·5 during the period of experiments, the centre of the room being 11°1 in excess. At the east wall, north of fire-place, it was 1°1 higher, and south of fire-place 1°·7 lower; and at the north and west walls was from 3°·0 to 3°·1 lower than in the centre of the room. The mean reading of the wet-bulb, which in the external air was 43°·3, was 8°·9 in excess in the centre of the room; and the mean dew-point temperature, which was 39°·8 in external air, was 7°·5 in excess in the room. The degree of humidity was 10 less in the room than in the external air, which was 78.

Feb. 21. Leslie's Stove raised.—For the 24 hours, the mean temperature was 44°·2 in external air, and during the experiments it was 46°·1, the centre of room being 10°·6 higher. At the east wall, north of fire-place, it was 1°·8 higher; south of fire-place 1°·0 lower; and at the north and west walls, from 2°·2 to 2°·5 lower than in the centre of the room. The mean reading of the wet-bulb was 43°·3 out of doors, and 8°·1 higher in the centre of the room; and the mean dew-point temperature was 40°·1 out of doors, being 6°·4 higher in the centre of room. The degree of humidity was 13 less than in external air, which was 81.

EXPERIMENTS

To Determine the Temperature of the Floor, and at different Distances above it.

All the thermometers with which these experiments were made, were furnished with small bulbs, were all graduated on their own stems, and were suspended from pins projecting from an upright for a period from December 18 to December 23; after this time they were passed through perforations made in the upright, and placed nearly horizontal: all the distances from the ground were carefully measured. The upright carrying the thermometers was placed at the least distance from the fire (4 feet), and when the instruments were read, was removed to the middle distance; after a little time, the instruments were again read, and again removed to the greater distance, the time of reading recorded being that of the middle set, care being taken in every case to be certain that the true temperature had been obtained. Two maximum thermometers were placed on the carpet directly opposite to the fire, the one at a distance of 7 feet, and the other at 15 feet, for the determination of the highest temperature attained daily at those places.

By taking the mean of all the experiments daily, the next Table has been formed.

Board Room.—Determination of the Mean Daily Temperature of the Air at different Heights above the Floor.

Year, Month, and Day.	Distance from Fire.	Name of Stove.	MEAN READING OF THERMOMETERS.																				
			Different Heights above the Carpet, in Inches.																				
			0·0	1·0	1·5	2·0	3·0	4·2	5·0	6·0	10·0	10·5	14·0	14·6	15·0	16·5	19·0	20·0	23·0	24·0	25·0	27·0	30·0
1856:	Feet.		Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Dec. - 19	4	Arnott's	69·7	–	63·3	–	–	65·7	–	–	–	67·4	–	66·7									
	5	,,	67·2	–	61·9	–	–	63·9	–	–	–	64·8	–	63·9									
	6	,,	64·9	–	60·2	–	–	61·7	–	–	–	62·3	–	62·2									
Dec. - 20	4	,,	71·2	–	66·0	–	–	68·6	–	–	–	66·6	–	67·1									
	5	,,	67·1	–	63·6	–	–	65·0	–	–	–	63·2	–	63·6									
	6	,,	64·0	–	61·9	–	–	63·1	–	–	–	61·0	–	61·2									
Dec. - 22	4	,,	69·2	–	64·8	–	–	66·5	–	–	–	65·6	–	65·6									
	5	,,	65·7	–	62·3	–	–	63·3	–	–	–	61·9	–	62·2									
	6	,,	63·8	–	61·3	–	–	61·9	–	–	–	59·6	–	60·4									
Dec. - 23	4	,,	66·2	–	61·4	–	–	62·4	–	–	–	63·4	–	64·0									
	5	,,	63·7	–	59·4	–	–	60·7	–	–	–	60·8	–	61·3									
	6	,,	61·7	–	57·8	–	–	58·9	–	–	–	58·6	–	59·2									
Dec. - 29	4	,,	64·3	56·5	–	56·4	56·4	–	–	56·4	56·0	–	–	–	–	56·7	56·5						
	5	,,	59·8	53·2	–	53·6	53·1	–	–	53·3	53·0	–	–	–	–	53·3	53·1						
	6	,,	57·5	51·5	–	51·5	51·4	–	–	51·5	51·2	–	–	–	–	51·5	51·3						
Dec. - 30	4	,,	60·6	55·8	–	55·6	55·5	–	–	55·5	55·4	–	–	–	–	56·0	55·7						
	5	,,	57·3	53·3	–	53·2	53·2	–	–	53·2	53·2	–	–	–	–	53·6	53·4						
	6	,,	56·0	51·7	–	51·7	51·7	–	–	52·1	52·2	–	–	–	–	52·4	52·4						
Dec. - 31	4	,,	65·5	60·5	–	60·2	60·1	–	–	60·1	59·9	–	–	–	–	60·2	60·0						
	5	,,	62·7	58·4	–	57·7	57·9	–	–	58·1	57·8	–	–	–	–	57·9	57·8						
	6	,,	60·7	56·9	–	56·8	56·6	–	–	56·8	56·7	–	–	–	–	56·8	56·8						
1857:																							
Jan. - 2	4	,,	71·7	66·1	–	65·3	–	–	–	–	–	–	65·3	–	–	65·0	64·7	–	64·8	–	–	63·8	64·6
	5	,,	66·4	62·1	–	61·5	–	–	–	–	–	–	61·7	–	–	61·7	61·4	–	61·6	–	–	61·0	61·5
	6	,,	63·5	60·4	–	59·8	–	–	–	–	–	–	60·1	–	–	60·2	60·1	–	60·1	–	–	59·6	60·0
Jan. - 3	4	,,	70·0	65·6	–	64·6	–	–	–	–	–	–	64·4	–	–	64·2	63·9	–	63·9	–	–	63·3	63·8
	5	,,	66·2	62·3	–	61·7	–	–	–	–	–	–	61·4	–	–	61·3	61·1	–	61·0	–	–	60·6	60·6
	6	,,	64·0	60·6	–	60·3	–	–	–	–	–	–	60·0	–	–	59·9	59·7	–	59·5	–	–	59·0	59·2
Jan. - 16	4	,,	67·8	62·0	–	61·3	–	–	–	–	–	–	62·1	–	–	62·0	62·3	–	–	61·9	–	61·8	60·8
	5	,,	64·1	58·6	–	58·2	–	–	–	–	–	–	58·8	–	–	58·7	58·8	–	–	58·3	–	58·3	57·5
	6	,,	62·8	58·3	–	57·8	–	–	–	–	–	–	57·7	–	–	57·4	57·4	–	–	57·1	–	57·1	56·4
Jan. - 17	4	,,	66·5	60·7	–	60·1	–	–	–	–	–	–	60·8	–	–	60·7	61·1	–	–	61·0	–	60·8	60·0
	5	,,	61·7	56·7	–	56·3	–	–	–	–	–	–	57·3	–	–	57·3	57·3	–	–	57·2	–	57·1	56·3
	6	,,	59·4	55·7	–	55·4	–	–	–	–	–	–	55·9	–	–	55·8	55·7	–	–	55·3	–	55·4	54·6
Jan. - 19	4	,,	70·6	64·2	–	63·6	–	–	–	–	–	–	64·5	–	–	64·5	64·6	–	–	64·5	–	64·8	63·7
	5	,,	65·4	60·4	–	60·3	–	–	–	–	–	–	61·2	–	–	61·1	61·2	–	–	61·0	–	61·0	60·3
	6	,,	63·0	59·1	–	58·9	–	–	–	–	–	–	59·4	–	–	59·3	59·4	–	–	59·2	–	59·2	58·5

(continued)

BOARD ROOM.—Determination of the Mean Daily Temperature of the Air at different Heights above the Floor—*continued.*

Year, Month, and Day.	Distance from Fire.	Name of Stove.	MEAN READING OF THERMOMETERS.																				
			Different Heights above the Carpet, in Inches.																				
			0·0	1·0	1·5	2·0	3·0	4·2	5·0	6·0	10·0	10·5	14·0	14·6	15·0	16·5	19·0	20·0	23·0	24·0	25·0	27·0	30·0
1857:	*Feet.*		*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
Jan. - 28	4	Leslie's stove on the ground	57·2	53·3	–	52·2	–	–	–	–	–	–	–	–	53·3	–	–	53·6	–	–	53·7	–	53·4
	5	"	52·8	49·8	–	49·8	–	–	–	–	–	–	–	–	50·8	–	–	50·8	–	–	51·0	–	50·5
	6	"	50·6	48·9	–	48·9	–	–	–	–	–	–	–	–	49·3	–	–	49·1	–	–	49·6	–	49·5
Jan. - 29	4	"	57·1	51·6	–	51·6	–	–	–	–	–	–	–	–	52·0	–	–	52·1	–	–	52·0	–	51·5
	5	"	53·0	49·2	–	49·2	–	–	–	–	–	–	–	–	49·7	–	–	49·7	–	–	49·8	–	49·3
	6	"	51·5	48·4	–	48·4	–	–	–	–	–	–	–	–	48·4	–	–	48·3	–	–	48·4	–	48·4
Jan. - 30	4	"	68·1	61·2	–	61·2	–	–	–	–	–	–	–	–	62·7	–	–	62·3	–	–	61·0		
	5	"	60·5	55·5	–	55·4	–	–	–	–	–	–	–	–	56·7	–	–	56·4	–	–	55·6		
	6	"	55·1	52·7	–	52·6	–	–	–	–	–	–	–	–	53·9	–	–	53·6	–	–	53·1		
Jan. - 31	4	"	65·7	59·9	–	59·4	–	–	–	–	–	–	–	–	61·0	–	–	60·9	–	–	60·0	–	58·9
	5	"	60·3	56·0	–	56·0	–	–	–	–	–	–	–	–	57·0	–	–	56·8	–	–	56·0	–	55·2
	6	"	56·7	54·4	–	54·3	–	–	–	–	–	–	–	–	55·6	–	–	55·2	–	–	54·6	–	53·7
Feb. - 2	4	"	59·3	55·0	–	55·0	–	–	55·1	–	54·9	–	–	–	55·4	–	–	55·3	–	–	54·6	–	53·6
	5	"	55·3	51·6	–	51·7	–	–	51·5	–	51·4	–	–	–	51·9	–	–	51·8	–	–	51·4	–	50·7
	6	"	51·0	49·1	–	49·1	–	–	49·3	–	49·3	–	–	–	49·8	–	–	49·6	–	–	49·3	–	48·5
Feb. - 13	4	Leslie's stove raised 6·5 in.	65·9	60·0	–	60·1	–	–	60·0	–	59·6	–	–	–	59·8	–	–	59·5	–	–	58·7	–	58·4
	5	"	60·3	57·4	–	57·2	–	–	57·2	–	57·0	–	–	–	57·2	–	–	57·0	–	–	56·7	–	56·4
	6	"	58·8	56·3	–	56·3	–	–	56·0	–	55·8	–	–	–	56·0	–	–	55·9	–	–	55·6	–	52·0
Feb. - 14	4	"	66·1	61·4	–	61·2	–	–	61·0	–	60·6	–	–	–	61·2	–	–	60·8	–	–	60·2	–	59·8
	5	"	61·6	58·2	–	58·0	–	–	57·9	–	57·7	–	–	–	58·0	–	–	57·9	–	–	57·5	–	57·2
	6	"	59·8	51·1	–	51·0	–	–	56·9	–	56·7	–	–	–	57·0	–	–	56·8	–	–	56·4	–	56·3
Feb. - 16	4	"	65·0	59·6	–	59·3	–	–	59·3	–	58·7	–	–	–	59·3	–	–	58·9	–	–	58·3	–	57·8
	5	"	60·3	57·3	–	56·9	–	–	56·9	–	56·6	–	–	–	57·0	–	–	56·7	–	–	56·4	–	56·1
	6	"	58·8	56·0	–	56·0	–	–	55·9	–	55·7	–	–	–	56·0	–	–	55·6	–	–	55·3	–	54·8
Feb. - 18	4	"	72·7	66·6	–	66·2	–	–	66·6	–	65·9	–	–	–	66·2	–	–	66·6	–	–	65·7	–	65·3
	5	"	67·3	63·6	–	63·6	–	–	63·6	–	63·4	–	–	–	63·5	–	–	63·3	–	–	62·6	–	62·3
	6	"	65·6	62·1	–	62·0	–	–	63·1	–	62·0	–	–	–	62·1	–	–	62·0	–	–	61·4	–	61·1
Feb. - 19	4	"	63·2	64·0	–	63·7	–	–	63·7	–	63·5	–	–	–	63·6	–	–	63·5	–	–	62·8	–	62·4
	5	"	64·6	61·4	–	61·3	–	–	61·4	–	61·3	–	–	–	61·6	–	–	61·3	–	–	60·9	–	60·6
	6	"	63·8	60·5	–	60·4	–	–	60·4	–	60·4	–	–	–	60·7	–	–	60·5	–	–	60·1	–	59·7
Feb. - 20	4	"	79·1	70·5	–	70·0	–	–	70·2	–	69·9	–	–	–	70·4	–	–	70·5	–	–	69·6	–	69·3
	5	"	71·3	66·9	–	66·8	–	–	66·9	–	66·6	–	–	–	67·0	–	–	66·6	–	–	65·8	–	65·5
	6	"	69·4	65·4	–	63·1	–	–	65·8	–	65·1	–	–	–	65·4	–	–	65·3	–	–	64·4	–	64·0
Feb. - 21	4	"	71·7	66·8	–	66·4	–	–	66·6	–	66·2	–	–	–	66·2	–	–	66·1	–	–	65·4	–	65·0
	5	"	67·2	63·5	–	62·5	–	–	63·7	–	63·3	–	–	–	63·6	–	–	63·4	–	–	63·0	–	62·6
	6	"	65·8	62·5	–	65·3	–	–	62·5	–	62·4	–	–	–	62·7	–	–	62·5	–	–	62·0	–	61·7

Board Room.—Arnott's Stove.

Discussion of the Mean Results of Experiments for the Determination of the Temperature of the Air of the Board Room, at different Heights above the Floor and different Distances from the Fire.

Dec. 19 to Dec. 23. Arnott's Stove.—At the level of 1½ inches above the the carpet, at the distance of 4 feet from the fire, the temperature was less than on the carpet in every experiment, varying from 4°·4 on Dec. 22, to 6°·4 on Dec. 19. At the distance of 5 feet it was always less, the deficiency varying from 3°·4 on Dec. 22, to 5°·3 on Dec. 19; and at the distance of 6 feet, the average deficiency of temperature varied from 2°·0 on Dec. 22, to 4°·7 on the 19th.

From the level of 1½ inch to 4½ inches the temperature increased at every experiment at 4 feet, from 1° to 2°·6; at 5 feet, from 1° to 2°; and at 6 feet, from 0°·6 to 1°·5.

From the level of 4½ inches to that of 10½ inches, there was an increase of temperature at the three distances on Dec. 19, a decrease on Dec. 20 and Dec. 22; and on Dec. 23, there was an increase of 1° at 4 feet; of 0°·1 at 5 feet; and a decrease of 0°·3 at 6 feet from the fire.

From the level of 10½ inches to that of 14½ inches, there was a decrease at the three distances on Dec. 19; and an increase on Dec. 20, 22, and 23.

Dec. 29 to 31. Arnott's Stove.—At the level of 1 inch above the carpet, at the distance of 4 feet from the fire, the temperature was less than on the carpet, at every experiment, varying from 4°·8 on Dec. 30, to 7°·8 on Dec. 29; at the distance of 5 feet it was always less, varying from 4$_0$·0 on Dec. 30, to 6°·6 on Dec. 29; and at 6 feet the average deficiency of temperature varied from 3°·8 on Dec. 31, to 7°·8 on Dec. 29.

From the height of 1 inch to 2 inches, there was a general slight decrease of temperature; the only exception being an increase of 0°·4 at the distance of 5 feet on Dec. 29. From the level of 2 inches to 3 inches, the change of temperature at the three distances was very slight.

From the height of 3 inches to 6 inches, the temperature slightly increased at the distances of 5 feet and 6 feet, but exhibited no change at the distance of 4 feet.

From the height of 6 inches to 10 inches, the temperature slightly decreased at the three distances, except on Dec. 30, when the temperature remained unchanged at the distance of 5 feet.

From the level of 10 inches to that of 14 inches, there was a general increase of temperature at the distance of 4 feet from the fire, varying from 0°·4 to 0°·7; at 5 feet, from 0°·2 to 0°·4; and at 6 feet, from 0°·1 to 0°·3.

From the level of 14 inches to 16½ inches, there was little or no change of temperature at the three distances on Dec. 29 and Dec. 31; but on Dec. 30 there was an increase of 0°·1 at each of the three distances.

From the level of 16½ inches to that of 19 inches, there was generally a slight decrease of temperature, amounting to 0°·2 at each of the three distances on Dec. 29; to 0°·3 at 4 feet; to 0°·2 at 5 feet; and without change at 6 feet on Dec. 30; and the deficiency was 0°·2 at 4 feet; 0°·1 at 5 feet; and without change at 6 feet from the fire on Dec. 31.

Jan. 2 to Jan. 19. Arnott's Stove.—At the level of 1 inch above the carpet, the temperature was less at every experiment than on the carpet, at the three distances from the fire. The deficiency, at 4 feet, varied from 4°·4 on Jan. 3, to 6°·4 on Jan. 19; at 5 feet, from 3°·9 on Jan. 3, to 5°·5 on Jan. 16; and at 6 feet, from 3°·1 on Jan. 2, to 4°·5 on Jan. 16.

From the level of 1 inch to 2 inches, the temperature decreased at every experiment; the deficiency varied from 0°·6 to 1°·0 at 4 feet; from 0°·1 to 0°·6 at 5 feet; and from 0°·2 to 0°·6 at 6 feet from the fire.

From the level of 2 inches to 14 inches, the temperature on Jan. 2 was unchanged at 4 feet, was 0°·2 in excess at 5 feet, and was 0°·3 higher at 6 feet from the fire. On Jan. 3 there was a decrease at each distance from the fire; on Jan. 16 the temperature was 0°·8 and 0°·6 in excess, at the distances of 4 feet and 5 feet respectively; and a decrease took place of 0°·1 at the distance of 6 feet from the fire. On Jan. 17 and 18 there was generally an increase of temperature not exceeding 1°.

From the level of 14 inches to that of 16·5 inches, the change was small; and from the height of 16·5 inches to 19 inches there was a slight decrease at the three distances on Jan. 2 and 3; and a small increase on Jan. 16, 17 and 19.

From the level of 19 inches to that of 27 inches, there was a general decrease of temperature at all the distances, except on Jan. 19, when there was an increase of 0°·3 at 4 feet; and no change at the other distances from the fire.

From the level of 27 inches to 30 inches, an increase took place on Jan. 2 and 3; and a small decrease on Jan. 16 and 17.

BOARD ROOM.—*Leslie*'s Stove on the Ground.

Jan. 28 to Feb. 2. Leslie's Stove on the ground.—At the height of 1 inch above the carpet, a decrease of temperature took place at each distance from the fire, varying from 3°·9 on Jan. 28, to 6°·9 on Jan. 30, at 4 feet from the fire; from 3°·0 on Jan. 28, to 5°·0 on Jan. 30, at 5 feet; and from 1°·7 on Jan. 28, to 3°·1 on Jan. 29, at 6 feet.

From the height of 1 inch to 2 inches, the change of temperature was exceedingly small; and from the height of 2 inches to 5 inches, the temperature increased, the excess varying from 0°·1 to 0°·7 at 4 feet; and at 5 feet on Feb. 2, there was a deficiency of 0° 2, varying to 0°·5 in excess on Jan. 30; and the excess varied from 0°·1 to 0°·6 at 6 feet from the fire.

From the height of 5 inches to 10 inches, there was scarcely any change in temperature; and from the height of 10 inches to that of 15 inches, there was a general increase at the three distances, varying from 0°·5 to 1°·0 at 4 feet; from 0°·4 to 0°·7 at five feet; and from 0° 4 to 2°·3 at 6 feet from the fire.

From the level of 15 inches to that of 30 inches there was generally a slight and gradual decrease at the three distances.

BOARD ROOM.—*Leslie's* Stove raised 6·5 inches above the Floor.

Feb. 13 to Feb. 21. Leslie's Stove raised 6·5 inches above the floor.—At the level of 1 inch above the carpet, a decrease of temperature took place at the three distances, varying from 4°·2 on Feb. 19, to 8°·6 on Feb. 20, at 4 feet; from 2°·9 on Feb. 13, to 4°·4 on Feb. 20, at 5 feet; and from 2°·5 on Feb. 13, to 8°·7 on Feb. 14, at 6 feet from the fire.

From the level of 1 inch to 2 inches, the temperature varied from 0°·1 higher to 0°·5 lower at 4 feet distance; from an equality to 1°·0 lower at 5 feet; and from 2°·8 higher to 2°·3 lower at 6 feet from the fire.

From the level of 2 inches to 5 inches, there was a slight decrease of temperature on Feb. 13 and 16; on Feb 14 an increase of 5°·9 took place at 6 feet from fire; an increase of 0° 4 at 4 feet, and of 1°·1 at 6 feet on Feb. 18; on Feb. 19 and 20 there was an increase of temperature; and at 6 feet from the fire, on Feb. 21, a decrease amounting to 2°·8.

From the level of 5 inches to 10 inches, a decrease took place at all the experiments; and from the level of 10 inches to that of 15 inches an increase took place, varying from 0°·1 to 0°·6 at 4 feet; from 0°·1 to 0°·4 at 5 feet; and from 0°·1 to 0°·3, at 6 feet from the fire.

From the level of 15 inches to 30 inches, the temperature decreased at the three distances; the deficiency varying from 0°·9 to 1°·5 at 4 feet; from 0°·8 to 1°·5 at 5 feet; and from 0°·7 to 4°·0 at 6 feet from the fire.

BOARD ROOM.—*Arnott*'s Stove.

Discussion of the Mean Daily Results for the Determination of the Temperature of the Floor of the Board Room, at different Distances from the Fire.

Dec. 16. Arnott's Stove.—At the distance of 7 feet from the fire, the highest reading of a thermometer during the day was 72°·5; and at the distance of 15 feet, was 52°·2 only, being a difference of no less than 20°. The thermometer at 7 feet was placed on the carpet, on one side of the Board Room table, and that at 15 feet was placed opposite to it, and on the other side, and both opposite to the fire.

Dec. 17. Arnott's Stove.—At the distance of 7 feet from the fire, the highest reading of a thermometer during the day was 74°·9, and at the distance of 15 feet was 51°·6 only, thus showing a difference of temperature on the carpet at one side of the Board Room table, and that on the other, of no less than 23°·3.

Dec. 18. Arnott's Stove.—The highest reading of a thermometer, at the distance of 7 feet from the fire, during the day, was 65°·5; and at the distance of 15 feet, was 55°·3; the difference of temperature between the two points being 10°·2.

Dec. 19. Arnott's Stove.—With an average temperature of 55°·7, the average excess of temperature, on the carpet, at 4 feet from the fire, was 14°·0; at 5 feet, was 11°·5; and at 6 feet, was 8°·2. At the distance of 7 feet from the fire, the highest temperature reached in the day was 68°·7; and at the distance of 15 feet, was 12°·9 below that at 7 feet.

Dec. 20. Arnott's Stove.—With an average temperature of 56°·4 in the room. there was an average excess of temperature on the carpet of 14°·8 at 4 feet; of 10°·6 at 5 feet; and of 7°·6 at 6 feet from the fire. The highest temperature attained, during the day, at 7 feet, was 66°·3; at 15 feet, the temperature was 9°·5 lower than at 7 feet.

Dec. 22. Arnott's Stove.—With an average temperature of 55°·3 in the room, on the carpet. at the distance of 4 feet from the fire, the average temperature was 13°·9; at 5 feet, 10°·4; and at 6 feet, was 8°·0 higher. The highest temperature, during the day, at 7 feet from the fire, was 65·7; and at 15 feet, was 56°·3.

Dec. 23. Arnott's Stove.—The average temperature of the room being 54°·3, that of the carpet, at 4 feet from the fire, was 11°·9; at 5 feet, was 9°·4; and at 6 feet, was 7°·4 higher. The highest temperature, at 7 feet from the fire, during the day, was 63°·8; and at 15 feet, was 8°·9 lower.

Dec. 29. Arnott's Stove.—With an average temperature in the room of 43°·5; the average excess on the carpet, at 4 feet from the fire, was 20°·8; at 5 feet, was 16°·3; and at 6 feet, was 14°·0. At 7 feet from the fire, the highest temperature, during the day, reached 54°·6; and at 15 feet, it reached 46°·6.

Dec. 30. Arnott's Stove.—The average temperature in the room being 47°·2; that on the carpet, at 4 feet from the fire, averaged 13°·4; at 5 feet, 10°·1; and at 6 feet, 8°·8 in excess. During the day, the highest temperature, at 7 feet from the fire, was 55°·7; and at 15 feet was 4°·8 lower.

Dec. 31. Arnott's Stove.—With an average temperature of 51°·4 in the room, there was an average excess of temperature on the carpet of 14°·1, at 4 feet; of 11°·3, at 5 feet; and of 9°·3, at 6 feet. The highest temperature reached during the day, at 7 feet, was 60°·0; and at 15 feet, was 53°·3.

Jan. 2. Arnott's Stove.—The average temperature of the room was 55°·2; and that of the carpet, at 4 feet from the fire, was 16°·5; at 5 feet, was 11°·2; and at 6 feet, was 8°·3 higher. At 7 feet from the fire, the highest temperature, during the day, was 65°·3; and at 15 feet, was lower by 7°·5.

Jan. 3. Arnott's Stove.—With an average temperature of 55°·1 in the room, that of the carpet was 14° 9, at 4 feet; was 11°·1, at 5 feet; and 8°·9 at 6 feet from the fire, in excess. The highest temperature, at 7 feet from the fire, during the day, was 65°·9; and at 15 feet, was 8°·0 lower.

Jan. 16. Arnott's Stove.—In the room, the average temperature was 52°·4; and on the carpet, at 4 feet from the fire, it was 15°·4; at 5 feet, was 11°·7; and at 6 feet, was 10°·4 higher.

Jan. 17. Arnott's Stove.—With an average temperature of 49°·9 in the room, the temperature, on the carpet, averaged 16°·6 in excess, at 4 feet from the fire; 11°·8, at 5 feet; and 9°·5, at 6 feet.

Jan. 19. Arnott's Stove.—With an average temperature of 54°·8 in the room, there was an average excess of temperature, on the carpet, of 15°·8, at 4 feet; of 10°·6, at 5 feet; and of 8°·2, at 6 feet from the fire.

Board Room.—*Leslie*'s Stove on the Ground.

Jan. 29. Leslie's Stove on the ground.—The temperature in the room averaged 45°·2: on the carpet, at 4 feet from the fire, there was an average excess of 11°·9; at 5 feet of 7°·8; and at 6 feet of 6°·3.

Jan. 30. Leslie's Stove on the ground.—The mean temperature of the room was 49°·9; that of the carpet, at 4 feet from the fire, was 18°·2; at 5 feet was 10°·6; and at 6 feet was 5°·2 higher.

Jan. 31. Leslie's Stove on the ground.—With a mean temperature of of 46°·9 in the room, that of the carpet, at 4 feet from the fire, was 18°·8; at 5 feet was 13°·4; and at 6 feet was 9°·8 in excess.

Feb. 2. Leslie's Stove on the ground.—The average temperature of the room was 43°·7; and that of the carpet was 15°·6 in excess at 4 feet; 11°·6 at 5 feet; and 7°·3 at 6 feet from the fire.

BOARD ROOM.—*Leslie's* Stove raised 6·5 inches above the floor.

Feb. 13. Leslie's Stove raised 6·5 inches above the floor.—With a mean temperature of 51°·7 in the room, the excess on the carpet, at the distance of 4 feet from the fire, was 14°·2; at 5 feet was 8°·6; and at 6 feet was 7°·1.

Feb. 14. Leslie's Stove raised.—The mean temperature was 52°·8 in the room, and at 4 feet from the fire was 13°·3 higher; at 5 feet and 6 feet distance, the excess was 8°·8 and 7°·0 respectively.

Feb. 16. Leslie's Stove raised.—With an average temperature of 51°·1 in the room, there was an average excess of temperature on the carpet of 13°·9 at 4 feet from the fire; of 9°·2 at 5 feet; and of 7°·7 at 6 feet.

Feb. 18. Leslie's Stove raised.—With a mean temperature of 55°·8 in the room, the excess of temperature on the carpet amounted to 16°·9 at 4 feet; to 11°·5 at 5 feet; and to 9°·8 at 6 feet from the fire.

Feb. 19. Leslie's Stove raised.—The temperature in the room averaged 55°·6, and on the carpet there was an average excess of 12°·6 at 4 feet; of 9°·0 at 5 feet; and of 8°·2 at 6 feet from the fire.

Feb. 20. Leslie's Stove raised.—In the room, the mean temperature was 57°·6, and on the carpet there was an excess of 21°·5 at 4 feet; of 13°·7 at 5 feet; and of 11°.8 at 6 feet distance from the fire.

Feb. 21. Leslie's Stove raised.—With an average temperature of 56°·7 in the room, there was an average excess of temperature on the carpet of 15°·0 at 4 feet; of 10°·5 at 5 feet; and of 9°·1 at 6 feet from the fire.

GENERAL BOARD of HEALTH.

SUMMARY of RESULTS as deduced from Experiments.

THE experiments at the Board of Health divide themselves into four groups:—

The first extending from December 16, 1856, to December 23, 1856.
The second extending from December 24, 1856, to January 19, 1857.
The third extending from January 29, 1857, to February 2, 1857.
The fourth extending from February 13, 1857, to February 21, 1857.

During the first two periods the board-room was heated by Arnott's stove, in the third period it was heated by Leslie's stove, and in the last period by Leslie's stove raised 6½ inches.

It is desirable to treat of these periods separately; first, by collecting all particulars relative to the distribution of heat over the room, and its relation to external temperature; and secondly, by considering its hygrometrical state as compared to the requirements of the room, in relation to the external hygrometrical states of the air.

With respect to temperature.

GENERAL BOARD of HEALTH.—BOARD ROOM.

RESULTS of Experiments when heated with Arnott's Stove, 16th December to 23d December 1856.

The mean temperature during the day and night was:—

	Deg.
External air - - - - - - - -	39·8
Near the north wall - - - - - -	51·9
Near the south wall - - - - - - -	51·9
Near the west wall - - - - - - -	52·9

Thus the temperature near the north and south walls was about 12° above that of external air, and near the west wall was 13° above.

Near the north and south walls the temperature, both night and day, was 12° warmer than the external air; near the west wall it rose to 14° during the day, and at night descended to a point 10°½ above the lowest external temperature.

The mean temperature during the period of observation was :—

	Deg.
Out of doors	41·2
Centre of room	54·5
Near the north wall	52·1
Near the south wall	52·4
Near the west wall	52·9
Of east wall south of fire-place	54·0
Of east wall north of fire-place	55·3
Of north wall	52·5
Of west wall, near north end	52·6
Of west wall, near south end	53·2

From these results it is shown that the air at the centre of the room was heated 13°½ over that of external air, and that it decreased in temperature to the amount of 2° on approaching the north wall and the northern part of the west wall; the decrease of temperature was about 1°½ on approaching the southern part of the west wall, about half a degree at the east wall, south of fire-place, and to a point a little north of fire-place the temperature was slightly higher than in the centre of the room. With an external temperature of 40° the general body of the air in the room was maintained above it 13°·0.

December 19 to December 23.

		Deg.
At 4 feet from the fire, the mean temperature on the carpet was		69·1
Ditto	1·5 inch above the carpet,	63·9
Ditto	4·2 inches „	65·8
Ditto	10·5 „	65·8
Ditto	14·6 „	65·9

The temperature on the floor was thus 4°8 warmer than at a point 1·5 inch above it, which was the point of lowest temperature; and was something more than 3° warmer than the column of air situated from 4 inches to 15 inches above the floor.

		Deg.
At 5 feet from the fire, the mean temperature on the carpet was		65·9
Ditto	1·5 inch above the carpet,	61·8
Ditto	4·2 inches „	63·2
Ditto	10·5 „	62·7
Ditto	14·6 „	62·8

At this point is indicated a decrease of temperature of 3°·2 on the floor, and of quantities varying from 2° to 3° at corresponding heights, as compared with the results at the distance of 4 feet.

		Deg.
At 6 feet from the fire, the mean temperature on the carpet was		63·5
Ditto	1·5 inch above the carpet.	60·3
Ditto	4·2 inches „	61·4
Ditto	10·5 „	60·4
Ditto	14·6 „	60·8

An increase of distance from the fire of two feet thus shows a decrease of mean temperature on the floor of the room of 5°·6, of which 2°·2 was caused by a removal from 5 to 6 feet. The lowest temperature is indicated at the point just above the carpet in the three different positions; at elevations between four and fifteen inches, almost the same temperature is shown at the different distances, but decreasing about 2° for each increase of distance of one foot.

At 7 feet from the fire the mean highest temperature was 66°·0, and at 15 feet, was 55°·8, and at times during the experiments the difference between the temperature on the floor at 4 feet from the fire, and that at 15 feet, exceeded 20° and between that at 7 and 15 feet was as much as 15°.

The average excess of temperature over that at the centre of the room on the carpet at 4 feet from the fire was 14°·6; at 5 feet was 11°·4; at 6 feet was 9°·0; at 7 feet was 7°·0, and at 15 feet was from 2° to 3° below the general temperature of the air.

At 1½ inch above the carpet, the excess of temperature over that at the centre of the room was 9°·4 at 4 feet; 7°·3 at 5 feet, and 5°·8 at 6 feet. From 4 inches high to 15 inches, the excess was 11°½ at 4 feet; 8°½ nearly at 5 feet, and 6°½ nearly at 6 feet.

The following are the particulars relative to the hygrometric state of the air of the room.

The mean temperature during the period of observation was :—

		Deg.		Deg.
Of evaporation—	Out of doors	39·2,	and of the dew-point	36·6
,,	Centre of room	49·1	,,	44·1
,,	Near the north wall	47·1	,,	41·9
,,	Near the south wall	47·1	,,	41·8
,,	Near the west wall	47·4	,,	41·9

The elastic force of vapour out of doors being 0·220 inch, with 2·5 grains of water in a cubic foot of air, and a mean degree of humidity of 84, at the centre of the room, the elastic force of vapour was 0·289 inch, that is, there were 3·3 grains of water in a cubic foot of air, the degree of humidity being 68. At the walls the elastic force of vapour was 0·267 inch, the water present in a cubic foot of air was 3·0 grains, the degree of humidity at the north wall being 68; at the south wall 67; and at the west wall 65. Out of doors the air would have been saturated with ½ grain of water additional, whilst in the room it was 1½ grains short of saturation. In the room, water to the weight of more than ½ grain in a cubic foot, had evaporated from the walls, and from the presence of the observers, &c. The degree of humidity was nearly uniform almost all over the room.

Second period.

December 24, 1856, to January 19, 1857.

The mean temperature during the day and night was—

	Deg.
Out of doors	40·3
Near the north wall	48·5
Near the west wall	49·7

The walls of the room, therefore, were from 8° to 9° above the temperature of the external air, during the 24 hours of the day, and were to this amount in excess, both during the times of highest temperature in the day, and during the lowest at night.

At the period of observation the temperature was—

		Deg.
Out of doors		41·2
Centre of room		51·7
Near the north wall	4ft. 6 in. above the floor	49·6
Near the west wall, south end		50·7
In contact with east wall, south of fire-place		50·0
In contact with east wall, north of fire-place		51·4
In contact with north wall		48·8
In contact with west wall, north end		48·8
In contact with west wall, south end		49·5

At the centre of the room it was 60°½ in excess over that of external air; the temperature of the rooms decreased on approaching the walls on all sides, to the amount of 2°·1 near to, and of 2°·9 at the north wall; of 2°·9 at the north end of the west wall; of 1°·0 near the south end of the west wall, and of 2°·2 in contact with the wall; of 1°·7 at the southern part of the east wall near the fire-place; and of 0°·3 at the northern part near the fire-place. With a mean temperature of 40°½ out of doors, the body of air in the room was heated less than 10°.

From December 28, 1856, to January 19, 1857.

			Deg.
At the distance of 4 feet from the fire, the mean temperature, on the carpet, was			67·1
Ditto	1 inch above the carpet,		,, 61·4
Ditto	2	,,	,, 60·9
Ditto	3	,,	,, 61·0
Ditto	6	,,	,, 61·0
Ditto	10	,,	,, 60·8
Ditto	14·0	,,	,, 61·3
Ditto	16·5	,,	,, 61·1
Ditto	19·0	,,	,, 61·1
Ditto	23·0	,,	,, 61·1
Ditto	24·0	,,	,, 60·9
Ditto	27·0	,,	,, 60·5
Ditto	30·0	,,	,, 60·2

The mean temperature on the carpet here shown is 6°·2 warmer than at two inches above; from two inches above almost the same temperature is indicated to the height of 30 inches.

				Deg.
At 5 feet from the fire, the mean temperature, on the carpet, was				62·9
Ditto	1·0	inch above the carpet	„	58·1
Ditto	2·0	„	„	57·8
Ditto	3·0	„	„	57·7
Ditto	6·0	„	„	57·9
Ditto	10·0	„	„	57·7
Ditto	14·0	„	„	58·1
Ditto	16·5	„	„	58·1
Ditto	19·0	„	„	58·0
Ditto	23·0	„	„	58·0
Ditto	24·0	„	„	57·8
Ditto	27·0	„	„	57·7
Ditto	30·0	„	„	57·7

The above results compared with those found at the distance of four feet, show a decrease of temperature on the floor of 4°·2, and in the stratum of air from 1 inch to 30 inches elevation above the floor, a decrease of 3 degrees nearly.

				Deg.
At 6 feet from the fire, the mean temperature, on the carpet, was				60·8
Ditto	1	inch above the carpet	„	56·8
Ditto	2	„	„	56·5
Ditto	3	„	„	56·3
Ditto	6	„	„	56·5
Ditto	10	„	„	56·5
Ditto	14·0	„	„	56·7
Ditto	16·5	„	„	56·7
Ditto	19·0	„	„	56·6
Ditto	23·0	„	„	56·6
Ditto	24·0	„	„	56·3
Ditto	27·0	„	„	56·2
Ditto	30·0	„	„	55·9

On the floor, the decrease of mean temperature from 5 feet to 6 feet is 2°·1, and from 4 feet to 6 feet is 4°·3; and at all other places from 5 feet to 6 feet, is above 1°½, whilst the decrease from 4 feet to 6 feet is above 4°½.

At 7 feet from the fire the mean highest reading of a thermometer placed on the carpet was 60°·3, and at 15 feet was 53°·3, from observations taken between December 29 and January 3.

Arnott's Stove.

From March 25, 1857, to March 30, 1857.

				Deg.
At 6 feet from the fire, the mean temperature, at 1 foot above the carpet, was				55·7
Ditto	2	feet above the carpet	„	55·9
Ditto	3	„	„	56·3
Ditto	4	„	„	56·0
Ditto	5	„	„	55·7
Ditto	6	„	„	55·6
Ditto	7	„	„	55·5
Ditto	8	„	„	55·2
Ditto	9	„	„	55·0
Ditto	10	„	„	54·8
Ditto	11	„	„	54·4
Ditto	12	„	„	54·3
Ditto	13	„	„	54·4
Ditto	13·5	„	„	54·2
Ditto	13·75	„	„	54·5
Ditto	14·0	„	„	54·5

At the period of observation the mean temperature was—

		Deg.		Deg.
Of evaporation.—	Out of doors	39·2	and of the dew-point	36·7
„	Centre of room	46·9		42·3
„	Near north wall	45·1		40·3
„	Near west wall	45·7		40·4

The elastic force of vapour out of doors was 0·221 inch with 2·5 grains of water in a cubic foot of air, and a mean degree of humidity of 84; at the centre of the room, the elastic force of vapour was 0·272 inch, that is, there were 3·1 grains of water in a cubic foot of air, the degree of humidity being 71. At the walls the elastic force of vapour was 0·253 inch, the water present in a cubic foot of air was 2·9 grains; the degree of humidity at the north wall was 71; and at the west wall 68. Out of doors, the air would have been saturated with half a grain of water additional, whilst in the room it was 1¼ grain short of saturation.

RESULTS of Experiments when the room was heated with *Leslie*'s Stove on the ground. January 29 to February 2, 1857.

The mean temperature during the day and night was—

	Deg.
Out of doors	29·9
Near the north wall	42·6
Near the west wall	42·6

The walls of the room were therefore 12°¾ warmer than the external air. During the day the excess amounted to 13°, near the north wall, and to 14°½ near the west wall; at night the lowest temperature near the north wall was 12°, and the temperature near the west wall was 11°, above the lowest out of doors.

The mean temperature during the period of observation was—

		Deg.
Out of doors		31·7
Centre of room		45·2
Near the north wall	at 4 ft. 6 in. above floor	43·7
Near the west wall		43·6
In contact with east wall, south of fire-place		44·5
In contact with east wall, north of fire-place		44·7
In contact with north wall		42·4
In contact with west wall, north end		41·8

At the centre of the room the air was 13°½ warmer than the external air, decreasing to 12° near the north and west walls; to 12°·8 at the east wall, just south of the fire-place; to 13°·0 north of the fire-place; to 10°·7 at the north wall, and to 10°·1 at the north end of the west wall. The general body of the air was therefore heated to less than 13°·0. The temperature of the external air during this period was lower than during other periods, and the room was insufficiently warmed.

January 28 to February 2.

		Deg.
At 4 feet from the fire, the mean temperature,	on the carpet	was 61·5
Ditto	„ 1 inch above the carpet	„ 56·2
Ditto	„ 2 „ „	„ 55·9
Ditto	„ 5 „ „	„ 56·2
Ditto	„ 10 „ „	„ 56·1
Ditto	„ 15·0 „ „	„ 56·9
Ditto	„ 20·0 „ „	„ 56·8
Ditto	„ 25·0 „ „	„ 56·3
Ditto	„ 30·0 „ „	„ 53·5

The temperature on the floor here indicated is 5°·6 warmer than at the elevation of 2 inches above it; between 1 inch and 20 inches the temperature indicated is almost identical; but at 25 inches a decrease of 0°·5 is shown, as compared with the temperature of 20 inches, and a decrease of no less than 2°·8 is exhibited between 25 and 30 inches.

		Deg.
At 5 feet from the fire, the mean temperature,	on the carpet	was 56·4
Ditto	„ 1 inch above the carpet	„ 52·4
Ditto	„ 2 „ „	„ 52·4
Ditto	„ 5 „ „	„ 52·6
Ditto	„ 10 „ „	„ 52·7
Ditto	„ 15 „ „	„ 53·2
Ditto	„ 20 „ „	„ 53·1
Ditto	„ 25 „ „	„ 52·7
Ditto	„ 30 „ „	„ 51·4

An increase of one foot from the fire caused a decrease of mean temperature on the carpet of 5°·1, and at the different elevations of 4° nearly; the same decrease of temperature above 20 inches being shown as in the experiments at the distance of 4 feet.

		Deg.
At 6 feet from the fire, the mean temperature on the carpet	- -	was 53·0
Ditto - - - - - „	1 inch above the carpet -	„ 50·7
Ditto - - - - - „	2 „ - „ -	„ 50·6
Ditto - - - - - „	5 „ - „ -	„ 50·9
Ditto - - - - - „	10 „ - „ -	„ 50·5
Ditto - - - - - „	15 „ - „ -	„ 51·4
Ditto - - - - - „	20 „ - „ -	„ 51·1
Ditto - - - - - „	25 „ - „ -	„ 51·0
Ditto - - - - - „	30 „ - „ -	„ 50·0

With this increase from 5 to 6 feet distant from the fire, the temperature on the carpet decreased 3°·4 as compared with the distance of 5 feet, and 8°·5 as compared with the distance of 4 feet. The decrease of temperature from 1 inch to 30 inches elevation was about 2°½ as compared with 5 feet, and about 5°¼ as compared with those at 4 feet.

The mean temperature during the period of observation was—

	Deg.		*Deg.*
Of evaporation—Out of doors -	30·5	and of the dew-point -	27·4
„ Centre of room -	41·0	- „ - -	36·1
„ Near north wall -	39·1	- „ - -	33·6
„ Near west wall -	38·9	- „ - -	33·1

The elastic force of vapour, out of doors, was 0·150 inch with 1·8 grain of water in a cubic foot of air, and a mean degree of humidity of 83; at the centre of the room, the elastic force of vapour was 0·213 inch, or there was 2·4 grains of water in a cubic foot of air, the degree of humidity being 71. At the walls the elastic force of vapour was 0·190 inch, the water present in a cubic foot of air being 2·2 grains; the degree of humidity on the north wall was 70, and on the west wall was 66. Out of doors the air would have been saturated with ½ grain of water additional, whilst in the room it was 1¼ grain short of saturation.

RESULTS of Experiments when heated with *Leslie's* Stove raised 6·5 inches.

February 13 to February 21, 1857.

The mean temperature of the air during the period of observation was—

	Deg.
Out of doors - - - - - - - - -	44·7
Centre of room - - - - - - - -	54·5
In contact with east wall, south of fire-place - -	53·4
In contact with east wall, north of fire-place - -	56·4
In contact with north wall - - - - - -	51·7
In contact with west wall, north end - - - -	51·8
In contact with west wall, south end - - - -	51·9

At the centre of the room, the air was 9°·8 warmer than the external air; at the east wall, south of the fire-place, it was 8°·7; north of the fire-place was 11°·7; at the north wall was 7°·0; at the north end of the west wall was 7°·1; and at its south end was 7°·2. The general body of air in the room was heated about 9° only.

RESULTS of Experiments when heated with *Leslie's* Stove raised 6½ inches above the Floor.

February 13 to February 21.

		Deg.
At 4 feet from the fire, the mean temperature, on the carpet,		was 69·8
Ditto - - - -	1 inch above the carpet -	„ 65·5
Ditto - - - -	2 - „ - -	„ 63·8
Ditto - - - -	5 - „ - -	„ 62·5
Ditto - - - -	10 - „ - -	„ 63·5
Ditto - - - -	15 - „ - -	„ 63·8
Ditto - - - -	20 - „ - -	„ 63·7
Ditto - - - -	25 - „ - -	„ 62·9
Ditto - - - -	30 - „ - -	„ 62·6

Hence the temperature of the carpet was 6°·3 above the temperature of the air at the height of 5 inches, the point of lowest temperature being from 10 inches to 20 inches. The indications are about 1° warmer than at 5 inches; at above 25 inches the temperature decreases.

		Deg.
At 5 feet from the fire, the mean temperature, on the carpet, was		64·6
Ditto	1 inch above the carpet	61·2
Ditto	2 „	60·9
Ditto	5 „	61·1
Ditto	10 „	60·8
Ditto	15 „	61·1
Ditto	20 „	60·9
Ditto	25 „	60·4
Ditto	30 „	60·1

Increasing the distance from 4 feet to 5 feet, causes a decrease of temperature, on the carpet, of 5°·2, and at the different elevations of 2° to 3°.

RESULTS of Experiments when heated with *Leslie's* Stove raised 6·5 inches.

		Deg.
At 6 feet from the fire, the temperature of the carpet		was 63·0
Ditto	1 inch above the carpet	59·1
Ditto	2 „	58·8
Ditto	5 „	60·0
Ditto	10 „	59·7
Ditto	15 „	59·9
Ditto	20 „	59·8
Ditto	25 „	59·3
Ditto	30 „	58·5

By the increase of distance from 5 feet to 6 feet, a decrease is indicated in the mean temperature on the carpet of 1°·6; and from 4 feet to 6 feet of 6°·8. At the different elevations, a decrease from 5 feet to 6 feet caused a decrease of about 1°; and from 4 feet to 6 feet a decrease of about 4°.

February 27 to March 3.

		Deg.
At 6 feet from the fire, the mean temperature, at 1 foot above the carpet, was		56·7
Ditto	2 feet above the carpet	56·8
Ditto	3 „	5·57
Ditto	4 „	56·7
Ditto	5 „	56·1
Ditto	6 „	55·8
Ditto	7 „	55·7
Ditto	8 „	55·5
Ditto	9 „	55·3
Ditto	10 „	55·1
Ditto	11 „	55·0
Ditto	12 „	54·8
Ditto	13 „	54·8
Ditto	13·5 „	54·9
Ditto	13·75 „	55·2
Ditto	14·0 „	55·6

RESULTS of Experiments when heated with *Leslie's* Stove raised 6·5 inches.

February 13 to February 21, 1857.

The mean temperature during the period of observation :—

Of evaporation, out of doors, was 41°·9, and of the dew-point, was 38°·7.
Of evaporation, centre of room, was 49°·6, and of the dew-point, was 44°·2.

The elastic force of vapour, out of doors, was 0·236 inch, with 2·7 grains of water in a cubic foot of air, and a mean degree of humidity of 79; at the centre of the room the elastic force of vapour was 0·298 inch, or there were 3·3 grains of water in a cubic foot of air.

The following tables give a short summary of the results :—

I. *On the Temperature of the Air and Walls of the Board-room.*

1. Mean Temperature Day and Night.

Position of Thermometer.	Group 1. Arnott's Stove.	Group 2. Arnott's Stove.	Group 3. Leslie's Stove.	Mean.
	Deg.	*Deg.*	*Deg.*	*Deg.*
External air - -	39·8	40·3	29·9	36·6
Near north wall -	51·9	48·5	42·6	47·6
Near south wall -	51·9	—	—	—
Near west wall - -	52·9	49·7	42·6	48·4

Here the mean difference between the external and internal temperatures is 11°·4 ; in Group 1, the difference is 12°·4 ; in Group 2, it is 8°·8 ; and in Group 3, it is 12°·7.

2. Mean Temperature during Period of Observation.

Position of Thermometer.	Group 1. Arnott's Stove.	Group 2. Arnott's Stove.	Group 3. Leslie's Stove.	Group 4. Leslie's Stove, raised.	Mean.
	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*
External air - - - -	41·2	41·2	31·7	44·7	39·70
Centre of room - - - -	54·5	51·7	45·2	54·5	51·47
Near north wall - - -	52·1	49·6	43·7	- -	48·46
Near south wall - - -	52·4	—	—	—	—
Near west wall - - - -	52·9	50·7	43·6	- -	49·06
Of east wall (south end) - -	54·0	50·0	44·5	53·4	50·47
Of east wall (north end) - -	55·3	51·4	44·7	56·4	51·95
Of north wall - - - -	52·5	48·8	42·4	51·7	48·85
Of west wall (north end) - -	52·6	48·8	41·8	51·8	48·75
Of west wall (south end) - -	53·2	49·5	- -	51·9	51·53

A reference to the plan of the room will explain the variation of temperature in different parts. Of the air in the room that in the centre, and therefore opposite to the stove, is the warmest recorded in the table. That near the west wall, opposite the fire, is warmer than that near the north and south walls, and of these the former near the windows is colder than the latter near the passage.

The difference between the air in the centre of the room and that of the external atmosphere, is 13°·3 in Group 1, 10°·5 in Group 2, 13°·5 in Group 3, and 9°·8 in Group 4. The difference between the results of Leslie's stove when on the ground and when raised 6½ inches, may be attributable in part to the very different general temperature of the atmosphere when the two series of experiments were made.

The difference between the temperature of the north wall and the centre of the room was 2°·4 in Group 1, 2°·1 in Group 2, and 1°·5 in Group 3 ; the temperature of the air in the room being more equable with Arnott's than with Leslie's stove.

Of the thermometers placed in contact with the walls, those against the east wall (on the same side as the stove) indicated the highest mean temperature, and those in contact with the north wall the lowest; the mean difference being 2°·1 in Group 1, 1°·9 in Group 2, 2°·2 in Group 3, and 3°·2 in Group 4 ; where, as before, Arnott's stove maintains the most equable temperature.

The difference between the mean temperature of the walls and that at the centre of the rooms is 1°·0 in Group 1, 2° in Group 2, 1°·9 in Group 3, 1°·5 in Group 4 ; less difference, it will be observed, than between the temperature of the air near the walls and that in the centre of the room. The mean temperature of the east wall is very nearly the same as that of the room, and is in one instance higher.

The next series of experiments was to determine the temperature of the air of the board-room at different elevations from the floor, and at different distances from the fire.

All the thermometers with which the experiments were made had small bulbs, and were graduated upon their own stems. The upright for carrying the thermometers was first placed at the least distance (four feet) from the fire; when the instruments had been read off it was removed to the next distance (five feet), and after a little time the instruments were again read off; it was then removed to the greatest distance (six feet from the fire), care being taken in each case that the true temperature had been obtained.

From the experiments on the temperature of the air at different elevations, the following results were deduced.

3. Temperature of Air at different Elevations above the Carpet.

Arnott's Stove.

Mean temperature of external air, 41°·2.

Height above Floor, in Inches.	Four Feet from Fire.	Five Feet from Fire.	Six Feet from Fire.	MEAN.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*
On carpet.	69·1	65·9	63·5	66·16
1·5	63·9	61·8	60·3	62·00
4·2	65·8	63·2	61·4	63·46
10·5	65·8	62·7	60·4	62·96
14·6	65·9	62·8	60·8	63·16

The temperature of the carpet is here the highest in the room, and in the range of four to six feet from the fire, the temperature decreased from 69° to 63°, that is a mean of 3° for each foot in distance from the fire. From a point 1½ inch above the carpet, the temperature of the air increased slightly, decreasing as it neared the ceiling, that at 1½ inch from the carpet being about 4° lower than the carpet itself.

At seven feet from the fire the mean highest temperature was 66°, and at 15 feet, was 55°·8; at times during the experiments the difference between the temperature on the floor at four feet from the fire and at 15 feet, exceeded 20°, and between the temperatures at seven feet and 15 feet, was as large as 15°.

Arnott's Stove.

Mean temperature of external air, 41°·2.

Height above Floor, in Inches.	Four Feet from Fire.	Five Feet from Fire.	Six Feet from Fire.	MEAN.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*
On carpet.	67·1	62·9	60·8	63·60
1·0	61·4	58·1	56·8	58·76
2·0	60·9	57·8	56·5	58·40
3·0	61·0	57·7	56·3	58·33
6·0	61·0	57·9	56·5	58·48
10·0	60·8	57·7	56·5	58·33
14·0	61·3	58·1	56·7	58·70
16·5	61·1	58·1	56·7	58·63
19·0	61·1	58·0	56·6	58·53
23·0	61·1	58·0	56·6	58·53
24·0	60·9	57·8	56·3	58·33
27·0	60·5	57·7	56·2	58·13
30·0	60·2	57·7	55·9	57·93

Leslie's

Leslie's Stove on the Ground.

Mean temperature of external air, 31°·7.

Height above Floor, in Inches.	Four Feet from Fire.	Five Feet from Fire.	Six Feet from Fire.	MEAN.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*
On carpet.	61·5	56·4	53·0	56·96
1	56·2	52·4	50·7	53·10
2	56·9	52·4	50·6	52·96
5	56·2	52·6	50·9	53·23
10	56·1	52·7	50·5	53·10
15	56·9	53·2	51·4	53·83
20	56·8	53·1	51·1	53·66
25	56·3	52·7	51·0	53·33
30	53·5	51·4	50·0	51·63

Leslie's Stove, raised 6½ inches.

Mean temperature of external air, 44°·7.

Height above Floor, in Inches.	Four Feet from Fire.	Five Feet from Fire.	Six Feet from Fire.	MEAN.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*
On carpet.	69·8	64·6	63·0	65·80
1	65·5	61·2	59·1	61·93
2	63·8	60·9	58·8	61·16
5	62·5	61·1	60·0	61·20
10	63·5	60·8	59·7	61·33
15	63·8	61·1	59·9	61·60
20	63·7	60·9	59·8	61·46
25	62·9	60·4	59·3	60·86
30	62·6	60·1	58·5	60·40

II. *Experiments on the Hygrometrical State of the Air and Temperature of Evaporation.*

If there be a great departure from the proper degree of humidity at any temperature, the air in a room will be either too dry or too damp for healthy and agreeable respiration, and more particularly to all occupants who are in any way affected by pulmonary complaints.

Dependent upon the hygrometrical state of the air, is the amount of vapour carried off from the lungs at every respiration, and that which is exhaled from the skin. With a low dew-point and a high temperature of the air, a large quantity of vapour is carried off from the lungs and but little exhaled from the skin; with a high dew-point the air will be a much less powerful absorbent of moisture, and will therefore absorb less from the lungs, while the exhalations from the body will be greatly increased.

Excessive heat, moisture or dryness of the air, destroys its salubrity and acts injuriously upon the animal system. The general temperature of the air of an inhabited room differs little with the season, and is usually at about 60° in winter, and 65° in summer. The amount of water necessary to render it healthy and agreeable at these temperatures, may be inferred from the following considerations.

Air between the temperatures of 30° and 70°, has its capacity for moisture doubled for an increase of less than 20° of temperature. At 30° when saturated with moisture, it contains two grains in a cubic foot; at 41° it contains three grains; at 49° it contains four grains; at 56°, five grains; at 66°, six grains; and at 70°, seven grains. When, therefore, the air of a room is heated sufficiently, at times when the external atmosphere is at a low temperature, and consequently contains very little moisture in the invisible state of vapour, the air becomes very dry, and this extreme aridity causes a rapid absorption from the skin and lungs of the occupants of the room; the loss of heat caused by this rapid evaporation, contracts the blood-vessels at the surface, whilst other parts not exposed to its influence are surcharged with the fluids driven from the extremities.

It is, therefore, absolutely necessary that water be present in the air to the amount of a little less than three grains at 50°, to four grains nearly at 60°, and to more than five grains at 70° in every cubic foot of air; these amounts will be present when the wet bulb thermometer reads about 45°, 54° and 63° respectively, when the dry bulb reads 50°, 60° and 70°, giving dew-points of 40°, 49° and 58° successively, or a degree of humidity of about 66°, when complete saturation is represented by 100.

		Deg.
When a cubic foot of air is saturated with	2 grains of water, it is at temperature of	30
	3 - - - ditto - - -	41
	4 - - - ditto - - -	49
	5 - - - ditto - - -	56
	6 - - - ditto - - -	61
	7 - - - ditto - - -	66
	8 - - - ditto - - -	70

And the actual amount of water which should be present at each of these temperatures, is as follow:—

	Deg.
1·4 grains at the temperature of - - -	30
2·0 - - ditto - - - - - -	41
2·7 - - ditto - - - - - -	49
3·4 - - ditto - - - - - -	56
4·0 - - ditto - - - - - -	61
4·7 - - ditto - - - - - -	66
5·3 - - ditto - - - - - -	70

	Deg.			
Therefore, at	30	there should be	0·6	grains short of saturation.
„	41	„	1·0	- - ditto.
„	49	„	1·3	- - ditto.
„	56	„	1·6	- - ditto.
„	61	„	2·0	- - ditto.
„	66	„	2·3	- - ditto.
„	70	„	2·7	- - ditto.

And these are the quantities which each cubic foot of air will be able to absorb of the vapour given off from the skin and from the lungs. If we take this amount at 12 grains per minute for each occupant, then the vapour from the body will saturate under the above circumstances,

			Deg.
For each person,	20	cubic feet of air per minute, -	at 30
Ditto -	12	„ - „ -	at 41
Ditto -	9	„ - „ -	at 49
Ditto -	7½	„ - „ -	at 56
Ditto -	6	„ - „ -	at 61
Ditto -	5½	„ - „ -	at 66
Ditto -	4½	„ - „ -	at 70

If the air cannot escape at these several rates per minute, the additional quantity of humidity thus received will cause an increase in the degree of moisture, supposing the temperature of the room to remain unchanged; the air becoming too damp, is one of the evils of defective ventilation.

1. Temperature of Evaporation and of the Dew-point.

—	Evaporation.					Dew-point.				
	Group 1. Arnott's.	Group 2. Arnott's.	Group 3. Leslie's.	Group 4. Leslie's, raised.	Mean.	Group 1. Arnott's.	Group 2. Arnott's.	Group 3. Leslie's.	Group 4. Leslie's, raised.	Mean.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*	*Degs.*	*Degrees.*	*Degrees.*	*Degrees.*	*Degrees.*	*Degs.*
Out of doors - - -	39·2	39·2	30·5	41·9	37·7	36·6	36·7	27·4	38·7	34·8
Centre of room - -	49·1	46·9	41·0	49·6	46·6	44·1	42·3	36·1	44·2	41·7
Near north wall - -	47·1	45·1	39·1	- -	43·7	41·9	40·3	33·6	- -	38·6
„ south „ - -	47·1	- -	- -	- -	- -	41·8	—	—	—	—
„ west „ - -	47·4	45·7	38·9	- -	44·0	41·9	40·4	33·1	- -	38·4

From these observed results we may deduce the following:

2. Elastic Force of Vapour and Degree of Humidity during Operation of *Arnott's* Stoves.

Position.	Group 1.			Group 2.		
	Elastic Force of Vapour in Inches.	Grains of Water in a Cubic Foot of Air.	Mean Degree of Humidity.	Elastic Force of Vapour in Inches.	Grains of Water in a Cubic Foot of Air.	Mean Degree of Humidity.
Out of doors - -	0·220	2·5	84	0·221	2·5	84
Centre of room - -	0·289	3·3	68	0·272	3·1	71
Near north wall -	0·267	3·0	68	0·252	2·9	71
„ south „ - -	0·266	3·0	67	—	—	—
„ west „ - -	0·267	2·9	65	0·253	2·9	68

On examining this table, it will be seen that the amount of water in the air of the room, during both series of experiments, was not far from that degree of saturation which we have found to be most advantageous, the air being nearer saturation in the second series than in the first. In Group 1, the air out of doors was only half a grain, whilst in doors it was 1½ grain short of saturation. In the room, water to the weight of more than half a grain in a cubic foot had evaporated from the walls, and from the presence of the observers, &c. The degree of humidity was nearly uniform all over the room.

In Group 2, out of doors, the air would have been saturated with half a grain of water additional, whilst in the room it was 1½ grain short of saturation.

3. Elastic Force of Vapour and Degree of Humidity, during the Operation of *Leslie's* Stove.

—	Group 3.			Group 4.		
	Elastic Force of Vapour in Inches.	Grains of Water in a Cubic Foot of Air.	Mean Degree of Humidity.	Elastic Force of Vapour in Inches.	Grains of Water in a Cubic Foot of Air.	Mean Degree of Humidity.
Out of doors - -	0·150	1·8	83	0·236	2·7	79
Centre of room - -	0·213	2·4	71	0·298	3·3	69
Near north wall -	0·193	2·2	70	—	—	—
„ west „ - -	0·189	2·2	66	—	—	—

From the results of these four sets of experiments it is evident that the air of the room was never sufficiently warm, and that the temperature at different parts of it was very variable. This difference of temperature was mainly caused by the cooling influence of the large surface of glass in the windows; at times during the experiments a mass of air was cooled from this cause, equal to 300 cubic feet, to the amount of 20° per minute. The air thus cooled becoming specifically heavier, and falling, whilst other portions taking its place, became cooled, and descended, thus caused a current to be established. With Arnott's stove in the first series of experiments, and with Leslie's in the fourth, the measure of this cooling influence was that 4,000 cubic feet of air were lowered one degree in temperature per minute; in the second series with Arnott's stove it amounted to 3,150, and in the third, with Leslie's stove, to 2,900 cubic feet per minute cooled to this extent during the whole time of the experiments. Other currents were also formed by the air coming in contact with the cold walls, and thus causing sheets of cold air to fall throughout the whole extent of the walls and windows, but with greater velocity, and to a greater amount at the windows than at the walls. These currents of air falling to the floor, caused it to become cool, and from thence passed onwards towards the fire, some of them to ascend the chimney, others to become heated, and ascend again to the ceiling, again to descend.

It should be borne in mind, that the occupant of a room will feel comfortable in a temperature of 60° or 62° in an undisturbed atmosphere, but will not feel warm at a much higher temperature if the air be at all in motion, and that how small soever the movement of the air may be at the lower part of the apartment, it will cause to the occupant a sensation of chilliness and discomfort at any temperature. If we remember this, and test the actual state of the room, as shown in the preceding results, by the conditions of a comfortable room mentioned in page 30, it will be seen that the Board-room beyond the circle in the immediate influence of the fire was insufficiently warmed, that the occupants would necessarily suffer from cold feet and drafts, and that the cold stratum of air just above the carpet, shown to exist by both stoves, close to the fire, together with the conflicting currents and general disturbance of the atmosphere of the room, caused by the falling sheets of cold air from the walls and windows, would in themselves be fatal to the health and comfort of its occupants, whether in the vicinity of the fire or elsewhere.

The floor of the room was cold, excepting that portion which was near the fire; at times differences of 20° were shown. That the floor be warm is indispensable to the comfort of an apartment.

The difference of temperature about the floor, the walls and the rooms generally, will fully account for the direction of the different currents of air as shown in Mr. Campbell's experiments (*see* Appendix I.)

In point of fact, it is not to be expected that one small fire can maintain 10,000 cubic feet of air at an equable temperature, when it is required to heat every minute from 3,000 to 4,000 cubic feet one degree in addition to that cooled by the walls, as well as to heat all required for ventilation. From these experiments it is to be inferred that rooms, where the cooling surface of glass is very large, compared to their area, can be scarcely habitable in cold weather, and that the only remedy would be the introduction of duplicate panes of glass. The experiments made for the determination of the effect of duplicate panes of glass will be found in Appendix F. From these we learn that with single panes of glass the thermometer in contact with the window inside read 2°·1 higher than the outside; and this result was obtained both from the experiments at the Board of Health, and at Hartwell House.

With double panes of glass separated 5 inches, the thermometer on the inside read 11°·7 in the drawing-room, and 12° in the billiard-room at Hartwell House, above those on the outside of the glass, the instruments being suspended in both cases from the window sash.

With glass separated 1 foot at the Board of Health, the difference shown was 10°¼ only, in the four days, but the small amount was attributable to a sudden increase of external temperature, from February 5 to February 6, of more than 10°. From the results above we may fairly infer that the difference in cold weather would be much more than 12°.

From these results we may readily see that great advantage would follow the use of double windows, and that it would effect a great saving of fuel, and freedom from draughts, besides causing the wall and floor to be maintained at a warmer and more uniform temperature.

General Board of Health.—Board Room.

Comparison of Results deduced from *Arnott's* Stove, with those derived from the use of *Leslie's* Stove.

With Arnott's stove a thermometer on the carpet upon the floor of the room, read from 3° to 4° less, on its removal from 4 feet to 5 feet from the fire, and still further decreased 2° on its removal to 6 feet.

With Leslie's stove on the floor, the decrease in temperature from 4 to 5 feet was 5°; a further decrease of 3°·4 took place on its removal to 6 feet.

With Leslie's stove raised, the decrease from 4 feet to 5 feet was 5°, and in the next foot was 1°·6.

The variation of temperature, by Arnott's stove on the carpet from 4 feet to 6 feet from the fire, amounted to 5° or 6°, whilst the variation by Leslie's stove, on the ground, amounted to 8°½, and, when raised, to 7° nearly.

Therefore the temperature was more uniform by Arnott's stove than by Leslie's in either position, but more particularly so when Leslie's was on the ground.

The temperature of the column of air to the height of 30 inches, directly opposite to the fire, by Arnott's stove at the distance of 4 feet, differed about 1°, and that at 5 feet and at 6 feet by quantities less than 1°.

The temperature of the column of air by Leslie's stove when on the ground, at the distance of 4 feet, varied between 53°·5 and 56°·9; at 5 feet between 51°·4 and 53°·2; and at 6 feet between 50° and 51°·4.

When Leslie's stove was raised 6½ inches above the floor, the temperature of the column of air at the distance of 4 feet differed by 2°·9; at 5 feet by 1°·1, and at 6 feet by 1°·3.

Therefore, the different columns of air as heated by Arnott's stove were more uniform in their temperature than those heated by Leslie's stove.

The column of air at 4 feet, as heated by Arnott's stove, was about 3° warmer than that at 5 feet, and about 4°½ warmer than that at 6 feet.

The column of air at 4 feet as heated by Leslie's stove on the ground was 3°½ warmer than that at 5 feet, and 5°½ warmer than at 6 feet.

The column of air at 4 feet, as heated by Leslie's stove raised from the floor, was 3°·8 warmer than at 4 feet, and 5° warmer than at 6 feet.

Therefore there was less difference of temperature in the whole mass of air as heated by Arnott's stove than by Leslie's, in either position.

There was less difference of temperature in the column of air when heated by Leslie's stove raised than when on the ground.

With Leslie's stove on the ground the general body of air was heated 13°, and when raised 6½ inches the general body of air was heated 9° only, but the circumstances of external temperature were so different between these two sets of experiments that the results can be viewed as indications only.

The general particulars of the room, both as to temperature and humidity, were almost identical in the periods from December 16 to December 23, when the room was heated by Arnott's stove, and from February 13 to February 21, when heated by Leslie's stove raised above the floor. They were as follows:—

		Deg.		*Deg.*
Temperature of air	Arnott's stove	54·5	Leslie's stove raised	54·5
Evaporation	„	49·1	„	49·6
Dew-point	„	44·1	„	44·2
		in.		*in.*
Elastic force of vapour	„	0·289	„	0·298
		grs.		
Water in a cubic foot of air	„	3·3	„	3·3
Short of saturation	„	1·5	„	1·5
Degree of humidity	„	68	„	69

These results may therefore be considered identical, and it only remains to compare them in relation to the corresponding conditions out of doors, which were as follows:—

	Dec. 17 to Dec. 23.	Feb. 13 to Feb. 21.
	Deg.	*Deg.*
Temperature of external air	was 41·2	was 44·7
Evaporation	was 39·2	was 41·9
Dew-point	was 36·6	was 38·7
	in.	*in.*
Elastic force of vapour	was ·266	was ·236
	grs.	*grs.*
Water in a cubic foot of air	was 2.5	was 2·7
Degree of humidity	was 84	was 79

Comparing these results together, it is shown that the temperature of the external air was 3·5° colder during the period when Arnott's stove was in operation than when Leslie's stove was in action; consequently the air when heated by Arnott's stove was warmed 3°·5 more than when heated by Leslie's stove, and as the degree of humidity out of doors was greater during the periods when Arnott's stove was tried, and as the degree of humidity maintained by the two stoves in the air of the apartment was equal, it follows that the drying effect of Arnott's stove was the greater.

Therefore, from all the experiments it would appear that the advantage was in favour of Arnott's stove, both as to the amount of heat and its equable distribution.

Two other sets of experiments were made for the purpose of comparing the action of these stoves together. In the two periods from February 27 to March 3, and from March 25 to March 30, the external temperature and degree of humidity were almost identical; in the first period the Board-room was heated by Leslie's stove raised, and in the latter by Arnott's stove which had been replaced. The temperature and hygrometric states of the external atmosphere were as follow:—

	Feb. 27 to March 3.	March 25 to March 30.
	Deg.	*Deg.*
Temperature of air	was 46·0	was 46·2
Evaporation	was 43·2	was 42·2
Dew-point	was 40·0	was 37·7
	in.	*in.*
Elastic force of vapour	was 0·247	was 0·228
	grs.	*grs.*
Vapour in a cubic foot of air	was 2·8	was 2·6
Short of saturation	was 0·7	was 0·9
Degree of humidity	was 80	was 73

And the corresponding results in the Board-room were:—

		Deg.		*Deg.*
Temperature of air—Leslie's stove raised,		54·4,	and Arnott's stove	54·4
Evaporation	„	49·8	„	48·8
Dew-point	„	45·2	„	43·4
		in.		*in.*
Elastic force of vapour	„	0·289	„	0·284
		grs.		*grs.*
Water in a cubic foot of air		3·4	„	3·2
Short of saturation	„	1·3	„	1·6
Degree of humidity	„	71	„	67

These results are nearly identical, and it now remains to compare them at different heights above the floor.

	Leslie's stove raised.	Arnott's.
	Deg.	*Deg.*
At 6 feet from fire, at the height of 1 foot above floor, the temperature was	56·7	55·7
Ditto - - - - 2 feet - - ,, was	56·8	55·9
Ditto - - - - 3 feet - - ,, was	57·5	56·3
Ditto - - - - 4 feet - - ,, was	56·7	56·0
Ditto - - - - 5 feet - - ,, was	56·1	55·7
Ditto - - - - 6 feet - - ,, was	55·8	55·6
Ditto - - - - 7 feet - - ,, was	55·7	55·5
Ditto - - - - 8 feet - - ,, was	55·5	55·2
Ditto - - - - 9 feet - - ,, was	55·3	55·0
Ditto - - - - 10 feet - - ,, was	55·1	54·8
Ditto - - - - 11 feet - - ,, was	55·0	54·4
Ditto - - - - 12 feet - - ,, was	54·8	54·3
Ditto - - - - 13 feet - - ,, was	54·8	54·4
Ditto - - - - 13·5 feet - - ,, was	54·9	54·2
Ditto - - - - 13·75 feet - - ,, was	55·2	54·5
Ditto - - - - 14·0 feet - - ,, was	55·6	54·5

These results show that to the height of 4 feet above the floor, the temperature of the air when heated by Leslie's stove raised, was about one degree warmer than when heated by Arnott's stove; that from 5 to 10 feet above the floor the temperature was nearly alike; that from 11 to 13 feet the temperature of air when heated by Leslie's stove was about half a degree in excess, and that the excess gradually increased. From these experiments the one stove appears to have been as effective as the other.

General Board of Health.—Board Room.

On the Movements of Air in the Board Room.—Appendix (J).

In the experiments instituted by J. F. Campbell, Esq., several curious and interesting facts were elicited. A balloon filled with gas and weighted until nearly of the same specific gravity as the atmosphere of the room, when brought near the fire gradually expanded until its equilibrium became destroyed; it then ascended, moving steadily along the ceiling to the window, where meeting with a cold descending current of air, it contracted and descended, moving, if not anchored in the carpet, towards the fire, to repeat the same process and effect a second flight. This constant repetition of condensation and expansion would continue *ad infinitum* while the fire continued to radiate heat, and the windows and walls to condense the air in contact with them.

These experiments with the balloon indicate, it will be seen, the direction of the atmospheric currents within the apartment. In Appendix (B.) will be found the corresponding variations of temperature in different parts of the room, which caused the expansion and condensation of the gases within the balloon, and indicated the direction in which its movements were guided.

This constant movement of the atmosphere was further illustrated by a number of filaments of fine silk suspended from the ceiling and from different parts of the room, showing perceptibly, not only the direction of the currents, but their comparative velocities as they were bent forward in the line of motion. As their motions were accelerated or retarded in the ratio of the differences of temperature of those parts through which the atmosphere flowed, it was curious to observe how rapidly the laws of expansion and contraction, and change of temperature were obeyed as the air passed through the room. The velocities of the currents are clearly indicated, not only by the silken threads, but also by the temperatures given in Appendix (B.), &c.

Fumes of muriate of ammonia followed the same course, and also showed an eddy above the mantel-piece. An anemometer placed on the mantel-piece indicated the strength of the upward current to be, with the fire lit, equivalent to a pressure of from 15 to 4½ grains to the square foot.

WELLINGTON BARRACKS: SOLDIERS' ROOMS.

EXPERIMENTS.

Wellington Barracks, Soldiers' Rooms, Nos. 25, 26, 27, and 28, were devoted to the experiments; they are all situated on the ground floor, and their relative positions and aspects will be seen in the annexed ground-plan. Room 25 was heated by an Arnott's stove, as put up by Mr. Bailey; room 26, by the usual barrack or ordnance stove, with the common wide fire-place; room 27, by a stove of Lee Stevens's construction; room 28, by an Arnott's stove, as put up by Mr. Edwards, with an air channel leading from the external atmosphere under the floor and into the room on one side of the fire-place; and room 32, situated immediately over room 28, by Mr. Jeakes's modification of Arnott's stove.

In order to determine the extremes and range of temperature, as well as the hygrometrical states of the air of these rooms, in each of them were placed a maximum thermometer, a minimum thermometer, and a dry and wet-bulb thermometer, near the centre of each room, at the height of six feet above the floor.

The readings of these instruments, and of nearly all others taken at the Wellington Barracks, were taken by Corporal Hart, of the Royal Sappers and Miners, who was appointed to the performance of this duty.

Other instruments were placed in the rooms for the purpose of determining the temperature of the floor and walls; and others at different distances from the floor up to the ceiling, at different distances from the fire, for the purpose of determining the distribution of heat about the rooms, and by inference the direction of the currents of air; and also, by the amount of difference, the probable rapidity of its motion. These experiments will be found in sections 2 and 3.

In section 4 will be found simultaneous determinations of the temperature, ranges of temperature, and the hygrometrical states of the external atmosphere. The remarks preceding the experiments in section 1 of those made at the General Board of Health, apply equally well here, and the following results should be examined in reference to them.

In the 1st section the numbers in the second column of the table show the temperature of the air just before, or at about the time of lighting the fire; they will be found to differ but little from that of the lowest temperature in rooms 25 and 28 respectively; in the next column the temperature of evaporation is shown, and the hygrometrical states of the air are shown in the remaining columns.

By comparison with the numbers in section 4, the difference of temperature and humidity in the rooms and out of doors will immediately be determined.

The experiments were made in rooms 25 and 28 till February 17; from February 18, rooms 26 and 27 were included; on February 20, Mr. Jeakes finished putting up the stove in room 32, but no coals could be obtained for this room till February 27; and on March 3 the observer was taken ill, and no new observer was appointed, and in consequence the experiments ceased.

In room 25, there was a fire before the commencement of experiments, and this room was occupied by the observer, who slept in it at night; it was not therefore strictly under the same circumstances as the other rooms, which were untenanted.

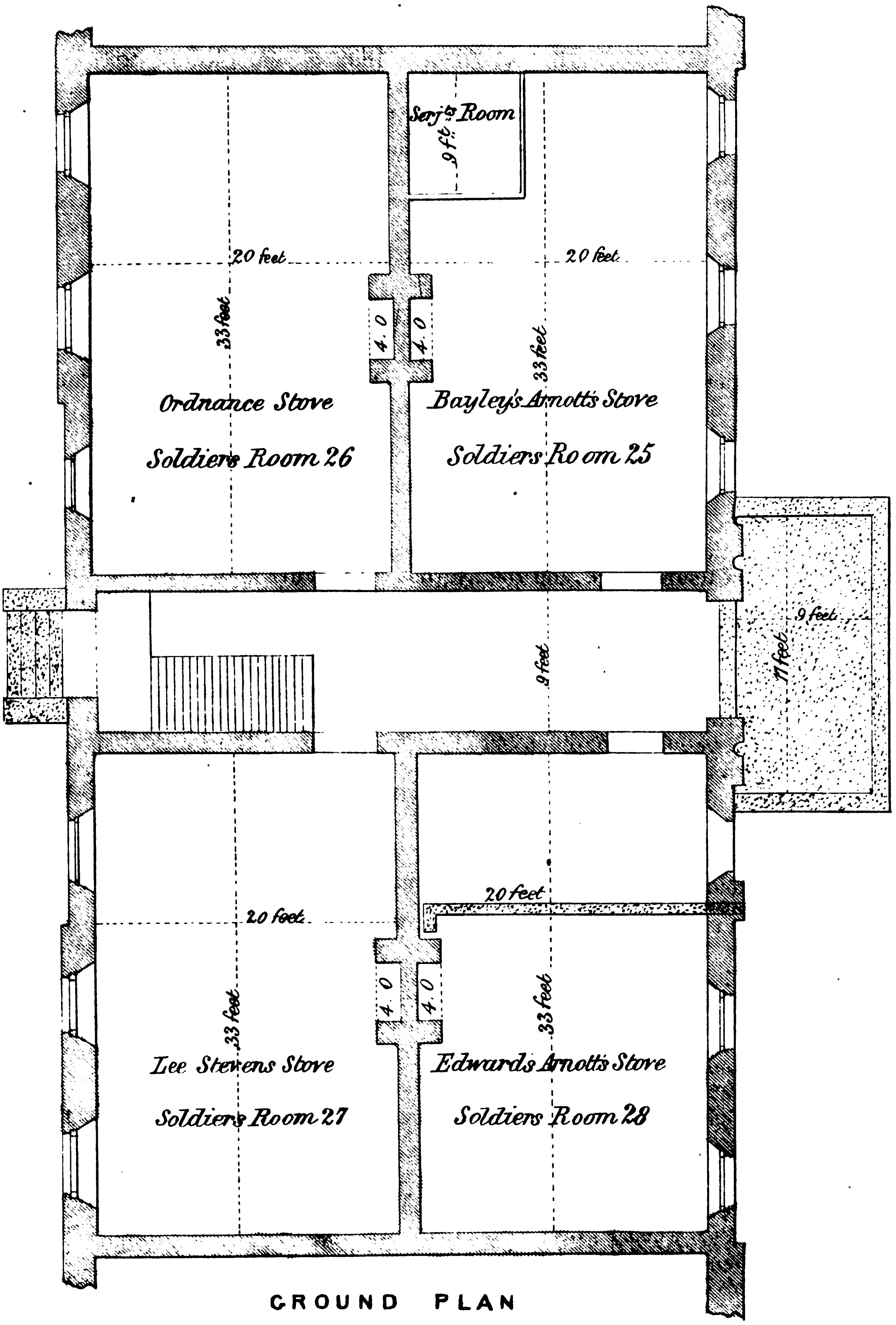
Room 32 was situated on the first floor, and was not under the same circumstances as the other rooms. It was, in fact, from 2° to 3° warmer than the other rooms when no fires were in action in any of them. The whole of these experiments, together with the first steps in their reduction, are deposited in the archives of the General Board of Health.

By taking the means of all the experiments made daily in the several rooms, and those out of doors in section 4, the following table of comparative results was formed.

To face p. 68.

WELLINGTON BARRACKS,

SOLDIERS ROOMS, Nos 25, 26, 27, & 28.



GROUND PLAN

Scale 10 feet to 1 Inch

Feet 10 9 8 7 6 5 4 3 2 1 0 10 20 feet

J. Basire lith.

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WELLINGTON BARRACKS.—Determination of the Mean Daily Temperature and Humidity of the Air in Soldiers' Rooms, 25, 26, 27, 28 and 32. Room 25 was heated by *Bailey's Arnott's*; 26, by Ordnance; 27, by *Lee Stevens'*; 28, by *Edward's Arnott's*; and 32, by *Jeakes'* Stoves.

Year, Month, and Day.	Position of Instruments.	Mean Reading of Thermometers, Centre of Room.		Temperature of Dew-point.	Elastic Force of Vapour.	Weight of Vapour in a Cubic Foot of Air.	Short of Saturation.	Degree of Humidity.	Mean Temperature of Day of 24 Hours.	Excess of Mean Temperature of Air in Room over that of External Air.	Excess of Temperature of Air in Room over that of External Air.		Range of Temperature in 24 Hours.	—
		Dry Bulb.	Wet Bulb.								Highest by Day.	Lowest by Night.		
		Deg.	*Deg.*	*Deg.*	*In.*	*Grs.*	*Grs.*		*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	
1857: Feb. - 14	Out of doors -	42·8	39·4	34·8	·202	2·4	0·8	75	40·5	- -	- -	- -	11·3	
	Room 25 -	51·5	46·0	40·3	·250	2·8	1·4	65	51·1	10·6	10·0	11·1	10·2	
	Room 28 -	50 6	46·1	41·4	·261	3·0	1·2	72	50·8	10·3	10·8	9·8	12·3	
Feb. - 16	Out of doors -	48·8	44·7	39·9	·246	2·8	1·1	72	42·0	- -	- -	- -	23·0	
	Room 25 -	51·8	46·8	41·7	·264	3·0	1·3	69	53·2	11·2	7·9	14·5	16·4	
	Room 28 -	51·4	46·2	40·8	·255	2·9	1·4	67	53·3	11·3	5·5	14·5	13·0	
Feb. - 17	Out of doors -	49·4	47·1	44·7	·296	3·4	0·7	84	44·5	- -	- -	- -	18·1	
	Room 25 -	55·3	49·9	44·8	·297	3·4	1·6	68	54·3	9·8	8·0	13·5	12·6	
	Room 28 -	53·7	48·3	43·0	·277	3·1	1·5	67	53·3	8·8	6·4	12·0	11·5	
Feb. - 18	Out of doors -	50·4	47·8	45·1	·301	3·4	0·7	88	40·4	- -	- -	- -	13·2	
	Room 25 -	59·6	54·8	50·5	·367	4·1	1·6	72	58·5	12·1	14·5	9·8	17·9	
	Room 26 -	55·7	51·3	47·2	·325	3·7	1·2	73	55·5	9·1	9·5	8·9	13·8	
	Room 27 -	55·6	51·2	47·1	·324	3·7	1·3	73	55·7	9·3	9·5	9·0	13·7	
	Room 28 -	57·2	51·0	45·3	·303	3·4	1·9	64	57·0	10·6	13·4	8·9	18·7	
Feb. - 19	Out of doors -	46·5	44·1	41·3	·260	3·0	0·6	84	44·2	- -	- -	- -	6·8	
	Room 25 -	57·7	51·6	46·0	·311	3·5	1·8	65	58·1	13·9	16·1	11·7	11·2	
	Room 26 -	57·6	51·7	46·3	·315	3·5	1·8	66	56·9	12·7	17·3	7·6	17·0	
	Room 27 -	56·7	51·5	46·7	·319	3·6	1·6	69	56·6	12·4	14·0	10·7	10·1	
	Room 28 -	58·6	51·5	45·2	·302	3·4	2·0	61	57·7	13·5	16·1	10·9	12·0	
Feb. - 20	Out of doors -	48·1	45·1	41·9	·266	3·0	0·8	79	44·4	- -	- -	- -	13·2	
	Room 25 -	58·2	51·9	46·2	·313	3·6	1·9	65	58·3	13·9	13·0	14·9	11·3	
	Room 26 -	58·8	52·2	46·4	·316	3·6	2·0	64	58·8	14·4	16·0	12·8	16·4	
	Room 27 -	57·7	52·6	47·9	·334	3·7	1·6	70	58·7	14·3	13·6	15·0	11·8	
	Room 28 -	58·6	51·7	45·5	·304	3·6	1·5	70	58·2	13·8	13·0	14·6	12·6	
Feb. - 21	Out of doors -	47·7	45·1	42·1	·268	3·1	0·7	81	43·4	- -	- -	- -	16·8	
	Room 25 -	57·2	51·1	45·5	·305	3·4	1·8	65	56·9	13·5	10·6	16·5	10·9	
	Room 26 -	56·3	50·7	45·5	·305	3·4	1·7	67	56·2	12·8	11·7	13·8	14·7	
	Room 27 -	57·6	51·4	45·8	·308	3·5	1·9	65	57·2	13·8	10·8	16·5	11·1	
	Room 28 -	58·4	51·5	45·4	·304	3·4	2·1	62	59·0	15·6	13·4	17·8	12·4	
Feb. - 23	Out of doors -	48·7	45·1	41·3	·260	2·9	1·0	77	45·0	- -	- -	- -	16·7	
	Room 25 -	56·6	50·2	44·3	·280	3·3	1·8	64	56·8	11·8	9·6	14·0	12·3	
	Room 26 -	56·9	51·3	46·2	·318	3·5	1·7	67	56·0	11·0	8·7	13·0	12·3	
	Room 27 -	58·0	52·4	47·4	·328	3·7	1·7	68	59·0	14·0	12·6	15·2	14·1	
	Room 28 -	56·8	50·1	44·0	·288	3·2	1·9	62	56·6	11·6	9·5	13·6	12·6	

(*continued*)

WELLINGTON BARRACKS.—Determination of the Mean Daily Temperature and Humidity of the Air in Soldiers' Rooms, &c.—*continued.*

Year, Month, and Day.	Position of Instruments.	Mean Reading of Thermometers, Centre of Room.		Temperature of Dew-point.	Elastic Force of Vapour.	Weight of Vapour in a Cubic Foot of Air.	Short of Saturation.	Degree of Humidity.	Mean Temperature of Day of 24 Hours.	Excess of Mean Temperature of Air in Room over that of External Air.	Excess of Temperature of Air in Room over that of External Air.		Range of Temperature in 24 Hours.	—
		Dry Bulb.	Wet Bulb.								Highest by Day.	Lowest by Night.		
		Deg.	*Deg.*	*Deg.*	*In.*	*Grs.*	*Grs.*		*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	
1857: Feb. - 24	Out of doors -	45·9	42·6	39·3	·241	2·8	0·8	78	43·5	- -	- -	- -	15·1	
	Room 25 -	56·4	50·8	44·7	·296	3·3	1·8	65	56·5	13·0	11·9	14·0	13·0	
	Room 26 -	54·2	49·3	44·5	·294	3·3	1·4	69	52·7	9·2	5·5	12·7	7·9	
	Room 27 -	58·8	52·3	47·0	·328	3·6	1·8	66	58·8	15·3	15·9	15·5	14·5	
	Room 28 -	56·7	49·4	42·6	·278	3·1	2·0	59	56·1	12·6	11·1	14·0	12·2	
Feb. - 26	Out of doors -	42·8	38·8	34·0	·196	2·3	0·9	72	40·0	- -	- -	- -	16·9	
	Room 25 -	49·5	44·7	39·7	·224	2·8	1·3	68	50·0	10·0	8·8	10·1	4·8	no fire.
	Room 26 -	50·0	45·9	41·6	·263	3·0	1·1	73	48·4	8·4	8·5	13·2	7·2	no fire.
	Room 27 -	51·1	46·6	41·9	·266	3·0	1·2	71	51·0	11·0	6·5	17·4	4·0	no fire.
	Room 28 -	50·1	45·2	40·0	·247	2·8	1·3	69	49·8	9·8	3·2	16·2	3·9	no fire.
	Room 32 -	51·8	45·8	40·1	·248	2·8	1·4	66	51·9	11·9	5·5	18·2	4·2	no fire.
Feb. - 27	Out of doors -	45·1	41·6	37·6	·225	2·6	0·8	75	40·0	- -	- -	- -	16·6	
	Room 25 -	54·1	48·2	42·4	·271	3·1	1·6	65	53·8	13·8	12·2	15·8	13·5	
	Room 26 -	52·5	47·6	42·6	·273	3·1	1·4	70	53·5	13·5	14·7	12·3	9·0	
	Room 27 -	51·6	47·6	43·6	·284	3·2	1·1	75	52·8	12·8	8·7	16·9	8·4	
	Room 28 -	54·2	47·5	40·9	·256	2·9	1·9	61	54·3	14·3	13·5	15·1	15·0	
	Room 32 -	55·8	49·0	42·6	·273	3·0	2·0	62	55·8	15·8	13·4	18·1	11·9	
Feb. - 28	Out of doors -	49·9	45·9	41·7	·264	3·0	1·1	74	46·5	- -	- -	- -	15·0	
	Room 25 -	55·4	49·8	44·5	·294	3·3	1·7	67	54·0	7·5	7·0	8·0	14·0	
	Room 26 -	57·1	51·7	46·7	·319	3·6	1·6	68	55·1	8·6	10·5	6·7	8·8	
	Room 27 -	57·2	52·8	48·7	·344	3·9	1·4	73	56·5	10·0	9·2	10·7	13·5	
	Room 28 -	56·3	49·9	44·0	·288	3·3	1·8	63	54·6	8·1	7·4	8·7	13·7	
	Room 32 -	59·1	52·3	46·3	·315	3·6	2·1	62	58·0	11·5	10·2	12·7	12·5	
Mar. - 2	Out of doors -	47·3	44·3	41·0	·257	3·0	0·8	79	43·5	- -	- -	- -	13·0	
	Room 25 -	58·2	52·4	47·3	·327	3·7	1·7	68	56·8	13·3	13·6	13·0	13·6	
	Room 26 -	56·4	51·4	46·8	·321	3·6	1·5	70	57·3	13·8	15·6	12·0	6·8	
	Room 27 -	56·8	52·9	49·4	·353	4·0	1·1	76	57·9	14·4	14·0	14·8	12·2	
	Room 28 -	56·1	50·1	45·8	·308	3·5	1·5	69	55·6	12·1	10·0	14·2	8·8	
	Room 32 -	60·4	53·5	46·5	·317	3·7	2·2	62	60·5	17·0	13·4	19·6	9·8	
Mar. - 3	Out of doors -	45·5	42·0	37·0	·228	2·6	0·6	75	44·8	- -	- -	- -	7·1	
	Room 25 -	60·7	51·0	42·5	·272	3·0	2·9	52	57·0	12·2	13·6	10·7	10·0	
	Room 26 -	53·1	45·7	44·3	·292	3·3	1·2	72	52·3	7·5	6·6	8·3	5·4	no fire.
	Room 27 -	52·6	49·0	47·3	·327	3·7	0·8	82	53·2	8·4	5·6	11·1	1·6	no fire.
	Room 28 -	57·4	51·3	45·8	·308	3·5	1·8	65	57·5	12·7	15·0	10·3	11·8	
	Room 32 -	59·5	52·1	45·6	·306	3·4	2·2	59	60·0	15·1	15·6	14·7	8·0	

WELLINGTON BARRACKS—SOLDIERS' ROOMS.

Discussion of the Mean Daily Results of the Experiments for the Determination of the Temperature and Humidity of the Air in Rooms 25, 26, 27, 28 and 32.

Feb. 14.—The average excess of temperature during the day observations was 8°·7 in room 25, and 7°·8 in room 28, above the mean external temperature of 42°·8. During the day and night the air temperature was 40°·5, whilst that of room 25 was 51°·1 and of room 28, was 50°·8. The air in the rooms at about the times of both maximum and minimum external temperature, was at a temperature about 10° higher at both these extremes.

Feb. 14.—The readings of the wet-bulb thermometer were 5°·5 in room 25, and 4°·5 in room 28, below that of the dry-bulbs adjacent; and the resulting dew-points were 5°·5 and 6°·6 respectively higher than that in external air; there was little less than ½ a grain in room 25, and something more in room 28, of water present in a cubic foot of air, than in the same mass of external air; and the degree of humidity in room 25 was 10, and in room 28 was 3, less than in external air, which was 75.

Feb. 16.—The average excess of temperature during the day observations was 3°·0 in room 25, and 2°·6 in room 28, above the mean external temperature of 48°·8. The excess during the day and night was 11°·¼ in both rooms 25 and 28. The temperature rose above that of the external air during the day by 7°·9 in room 25, and by 5°·5 in room 28; and sank at night to a point lower by 14°½ than in either room.

The readings of the wet-bulb thermometers were 5° in room 25, and 5°·2 in room 28, below that of the adjacent dry-bulb; and the resulting dew-points were only 1°·8 and 0°·9 respectively higher than that in external air; consequently there was but little more water present in the air, and the degree of humidity was 3 and 5 respectively less than in external air, which was 72.

Feb. 17.—The average excess of temperature during the day observations was 5°·9 in room 25, and 4°·3 in room 28, above the mean external temperature of 49°·4. The excess during the day and night was 9°¾ in room 25, and 8°¾ in room 28. The temperature rose during the day above that of the external air by 8°·0 in room 25, by 6°·4 in room 28; and external air sank at night to a point lower than the temperature in room 25, by 13°·5, and by 12° in room 28.

The reading of the wet-bulb thermometer was 5°·4 in both rooms 25 and 28 below that of the dry-bulb adjacent; and the resulting dew-point in room 25 was only 0°·1 higher than that of external air, whilst that in room 28 was 1°·7 less than that of external air; and the resulting degree of humidity in room 25 was 16, and in room 28 was 17, less than in external air, which was 84.

Feb. 18.—The average excess of temperature during the day observations was 9°·2 in room 25, 6°·8 in room 28, and 5°¼ in both rooms 26 and 27, above the mean external temperature of 50°·4. The excess during the day and night was 12°·1 in room 25, 10°·6 in room 28, 9°·3 in room 27, and 9°·1 in room 26. The temperature rose above that of external air during the day by 14°·5 in room 25, by 13°·4 in room 28, and by 9°·5 in rooms 26 and 27; and external air sank at night to a point lower than the temperature in room 25 by 9°·8; and by 9° in rooms 26, 27, and 28.

The readings of the wet-bulb thermometers were 4°·8 in room 25, 4°·4 in rooms 26 and 27, and 6°·2 in room 28, below those of the dry-bulbs adjacent; and the resulting dew-points were 5°·4, 2°·1, 2°·0 and 0°·2 respectively higher than that in external air; there was nearly ¾ of a grain in room 25, something less than ½ a grain in rooms 26 and 27, and 0·0 grain in room 28 of water present in cubic foot of air, than in the same mass of external air; and the degree of humidity was respectively 11, 10, 10, 19 lower in the rooms than in the external air which was 83.

Feb. 19.—The average excess of temperature during the day observations was 10°·2 in room 27, 12°·1 in room 28, and intermediate in rooms 25 and 26, above the mean external temperature of 46°·5. The excess during the day and night was 13°·9 in room 25, 13°·5 in room 28, 12°·7 in room 26, and 12°·4 in room 27.

The temperature rose above that of external air during the day by 17°·8 in room 26, 16°·1 in both rooms 25 and 28, and 14° in room 27; and external air sank at night to a point lower than in room 25 by 11°·7, in room 27 by 7°·6, and intermediate in the other two rooms.

Feb. 19.—The readings of the wet-bulb thermometers were 6°·1 in room 25, 5°·9 in room 26, 5°·2 in room 27, and 7°·1 in room 28, below those of the adjacent dry-bulbs; and the resulting dew-points were 4°·7, 5°·0, 5°·4, and 3°·9 respectively higher than that in external air; and water was more prevalent in the rooms than in the external air by about ½ a grain in each cubic foot of air; the degree of humidity was respectively 19, 18, 15, and 23 below that of the external air, which was 84.

Feb. 20.—The average excess of temperature during the day observations was 10°·7 in room 26, 10°·1 in room 25, 8°·7 in room 28, and intermediate in the remaining room above the mean external temperature of 48°·1. The excess during the day and night in room 26 was 14°·4, in room 27 was 14°·3, in room 25 was 13°·9, and in room 28 was 13°·8.

The excess of temperature above that of external air rose during the day to 16° in room 27, to 13° in both rooms 25 and 28, and to 13°·6 in room 27; and the external air sank at night to a point lower than in room 27 by 15° in room 26 by 12°·8, and intermediate in rooms 25 and 28.

Feb. 20.—The reading of the wet-bulb thermometer was 6°·3 in room 25, 6°·6 in room 26, 5°·1 in room 27, 6°·9 in room 28, below that of the adjacent dry-bulb; and the resulting dew-points were 4°·3, 4°·5, 6°·0, and 5°·1, respectively higher than that in external air; and water was more prevalent in the rooms than in the external air, by about ½ a grain in each cubic foot of air; the degree of humidity was respectively 14, 15, 9 and 9, below that of the external air, which was 79°.

Feb. 21.—The average excess of temperature during the day observations in room 28 was 10°·7, in room 26 was 8°·6, and intermediate in the other two rooms above the mean external temperature of 47°·7. The excess during the day and night in room 28 was 15° 6, in room 26 was 12°·8, and intermediate in rooms 25 and 27. The excess of temperature above that of external air during the day in room 28 was 13°·4, in rooms 25 and 27 was 10°¾, and was immediate in the remaining room; and the external air sank at night to a point lower than in room 28 by 17°·8, in room 26 by 13°·8, and intermediate in the other two rooms.

Feb. 21.—The reading of the wet-bulb thermometer was 6°·1 in room 25, 5°·6 in room 26, 6°·2 in room 27, and 6°·9 in room 28, below that of the adjacent dry-bulb thermometer; and the resulting dew-points were 3°·4 in rooms 25 and 26, 3°·7 in room 27, and 3°·3 in room 28, higher than that in the external air; and water was more prevalent by about ½ a grain in a cubic foot in the respective rooms than in the external air; the degree of humidity was respectively 16, 14, 16, and 19 below that of the external air, which was 81.

Feb. 23.—The average excess of temperature during the day observations in room 27 was 9°·3; in room 25 was 7°·9, and was intermediate in the rooms 26 and 28, above the mean external temperature of 48°·7. The excess during the day and night was 14°·0 in room 27, 11°·8 in room 25, 11°·6 in room 28, and 11° in room 26. The excess of temperature above that of external air rose during the day to 12°·6 in room 27, to 8°·7 in room 26, and intermediate in rooms 25 and 28; and the external air sank at night to a point lower than in room 27 by 15°·2; in room 26 by 13°·0, and intermediate in the other two rooms.

Feb. 23.—The reading of the wet-bulb was 6°·4 in room 25, 5°·6 in room 26, 5°·6 in room 27, and 6°·7 in room 28, below that of the dry-bulb thermometer adjacent; and the resulting dew-points were 3°·0, 4°·9, 6°·1, and 2°·7 respectively higher than that in external air; and water was somewhat more prevalent in the rooms than in the external air; the degree of humidity was respectively 13, 9, 12, and 19 lower in the rooms than in the external air, which was 77.

Feb. 24.—The average excess of temperature during the day observations was 12°·4 in room 27, 8°·3 in room 26, and intermediate in the other two rooms, above the mean external temperature of 45°·9. The excess during the day and night in room 27 was 15°·3, in room 26 was 9°·2, and intermediate in rooms 25 and 28. The excess of temperature above that of the external air during the day in room 27 was 15°·9, in room 25 was 11°·9, in room 28 was 11°·1, and in room 26 was 5°·5, and the external air sank at night to a point lower than in room 27 by 15°·5, in room 26 by 12°·7, and intermediate in the remaining two rooms.

Feb. 24.—The reading of the wet-bulb was 6°·1 in room 25, 4°·9 in room 26, 6°·0 in room 27, and 7°·3 in room 28 below that of the dry-bulb thermometer adjacent; and the resulting dew-points were 5°·4, 5°·2, 7°·7, and 3°·3 respectively higher than that in external air; and the amount of water in a cubic foot of air was about half a grain in excess in the rooms over the external air; and the degree of humidity was respectively 13, 9, 12, and 19 below that of the external air, which was 78.

Feb. 26.—The average excess of temperature during the day observations in room 27 was 8°·3, in room 25 was 6°·7, and intermediate in the other two rooms, above the mean external temperature of 42°·8. The excess during the day and night in room 27, was 11°·0; in room 26, was 8°·4; and intermediate in rooms 25 and 28. The excess of temperature above that of the external air during the day in room 27 was 6°·5, in room 25 was 3°·8, in room 26 was 3°·5, and in room 28 was 3°·2, and the external air sank at night to a point lower than in room 27 by 17°·4, in room 26 by 13°·2, and intermediate in the remaining two rooms.

Feb. 26.—The reading of the wet-bulb was 4°·8 in room 25, 4°·1 in room 26, 4°·5 in room 27, and 4°·9 in room 28, below that of the dry-bulb adjacent; and the resulting dew-points were 5°·7, 7°·6, 7°·9, and 6°·0 respectively higher than that in external air; and about half a grain of water in a cubic foot of air was present in the rooms, above that in the same mass of external air; and the degree of humidity was 4 in room 25, 1 in room 27, 3 in room 28, lower, and in room 26 was 1 higher than that of external air, which was 72.

Feb. 27.—The average excess of temperature during the day observations in rooms 25 and 28 was 9°, in room 27 was 6°·5, and intermediate in room 26, above the mean external temperature of 45°·1. The excess during the day and night in room 28 was 14°·3, in room 27 was 12°·8, and intermediate in the other two rooms. The excess of temperature above that of external air during the day in room 26 was 14°·7, in room 27 was 8°·7, and intermediate in rooms 25 and 28; and the external air sank at night to a point lower than in room 27 by 16°·9, in room 26 by 12°·3, and intermediate in the two remaining rooms.

Feb. 27.—The reading of the wet-bulb was 5°·9 in room 25, 4°·9 in room 26, 4°·0 in room 27, and 6° in room 28, below that of the dry-bulb adjacent; and the resulting dew-points were 4°·8, 5°·0, 6°·0, and 3°·3 respectively higher than that in external air; and water was more prevalent in the respective rooms than in the external air, to the amount of half a grain in a cubic foot of air.

The degree of humidity was respectively 10, 5, 0, and 14 lower than in the external air, which was 75.

Feb. 28.—The average excess of temperature during the day observations was 7°·3 in room 27, 7°·2 in room 26, 6°·4 in room 28; and 5°·5 in room 25, above the mean external temperature of 49°·9. The excess during the day and night in room 27 was 10°·0, in room 25 was 7°·5, and was intermediate in rooms 26 and 28. The excess of temperature above that of external air during the day in room 26 was 10°·5, in room 25 was 7°·0, and intermediate in the other two rooms; and the external air sank to a point lower than in room 27 by 10°·7, in room 26 by 6°·7, and intermediate in the remaining two rooms.

Feb. 28.—The reading of the wet-bulb was 5°·6 in room 25, 5°·4 in room 26, 4°·4 in room 27, and 6°·4 in room 28, lower than that of the dry-bulb thermometer adjacent; and the resulting dew-points were 2°·8, 5°·0, 7°·0, and 2°·3 respectively higher than that of external air; there was nearly ¾ of a grain in rooms 26 and 27, and something more than ¼ of a grain of water present in a cubic foot of air, than in the same mass of external air; and the degree of humidity was 7, 6, 1, and 11 respectively lower than that of external air, which was 74.

March 2.—The average excess of temperature during the day's observations was 10°·8 in room 25, 8°·8 in room 28, and intermediate in rooms 26 and 27, above the mean external temperature of 47°·3. The excess during the day and night in room 27 was 14°·4, in room 28 was 12°·1, and intermediate in the two other rooms. The excess of temperature above that of external air during the day in room 26 was 15°·6, in room 28 was 10°·0, and intermediate in rooms 25 and 27; and the external air sank at night to a point lower than in room 27 by 14°·8, in room 26 by 12°·0, and intermediate in the remaining two rooms.

March 2.—The reading of the wet-bulb was 5°·8 in room 25, 5°·0 in room 26, 3°·9 in room 27, and 6°·0 in room 28, below that of the adjacent dry-bulb thermometer; and the resulting dew-points were 6°·3, 5°·8, 8°·4 and 4°·8 respectively higher than that of external air. And there was 1 grain in room 27, nearly ¾ of a grain in rooms 25 and 26, and ½ a grain in room 25, of water present in a cubic foot of air, than in the same mass of external air. The degree of humidity was 11 in room 25, 9 in room 26, 3 in room 27, and 10 in room 28, lower than that of external air, which was 79.

March 3.—The average excess of temperature during the day's observations was 15°·2 in room 25, 11°·9 in room 28, 7°·6 in room 26, and 7°·1 in room 27, above the mean external temperature of 45°·5. The excess during the day and night in room 28 was 12°·7, in room 25 was 12°·2, in room 27 was 8°·4, and in room 26 was 7°·5. The excess of temperature above that of external air in room 28 was 15°·0, in room 25 was 13°·6, in room 26 was 6°·6, and in room 27 was 5°·6; and the external air sank at night to a point lower than in room 27 by 11°·1, in room 26 by 8°·3, and intermediate in the other two rooms.

March 3.—The reading of the wet-bulb was 9°·7 in room 25, 4°·4 in room 26, 2°·7 in room 27, and 6°·1 in room 28, below that of the dry-bulb thermometer adjacent; and the resulting dew-points were 4°·6, 6°·4, 9°·4, and 7°·9 respectively higher than that of external air; and there was about 1 grain in rooms 27 and 28, ¾ of a grain in room 26, and about ½ a grain in room 25 of water present in a cubic foot of air, more than in the same mass of external air. The degree of humidity was 23 in room 25, 3 in room 26, and 10 in room 28, less; and in room 27 it was 7 more than in the external air, which was 75.

EXPERIMENTS to determine the Temperature of the Air at different Distances from the Floor.

All the thermometers with which these experiments were made had very small bulbs; they were graduated on their own stems, and were identical, in every respect, with those used in the experiments at the General Board of Health (*see* Section 2). Uprights were prepared for each room, fixed to the floor, and extending to the ceiling. These were perforated at every foot, and the thermometer stems passed through them, and made fast with wedges, so that their bulbs were at the proper distances from the floor. Till February 24, these uprights were fixed so that the bulb of the thermometer, which was directly opposite to the fire, was at the distance of 4 feet. After this day it was removed to the distance of 10 feet from the fire. The discussion of the experiments in each room follows the tables.

WELLINGTON BARRACKS, Room 28.—*Edwards's Arnott's* Stove.

Discussion of the Results of Experiments for the Determination of the Temperature of the Floor, and of different Heights above the Floor, of Soldiers' Room, No. 28, at different Distances from the Fire.

The temperature of the air in the room, before lighting the fire, was very uniform, and the floor was always warmer than the air in the room at these times.

Some little time after the fire was lighted, the temperature of the floor, at the distance of 4 feet from the fire, increased several degrees above that of the air of the room; the largest excess was 15°·8 on February 17. At the distance of 10 feet, the largest excess was 3°·0.

The temperature at the level of one foot above the floor was, in every instance, less than that on the floor, by quantities varying up to 4°·2 at 4 feet; and to 3°·0 at 10 feet.

An increase of temperature took place in the next foot, usually from 1° to 2°, and in one case to 3° on February 24, at the lesser distance; and a small increase took place at the greater distance.

From 2 to 3 feet a small increase again took place, in one case only amounting to one degree.

From 3 feet to 6 feet there was a decided decrease of temperature in the 4 feet column, in every case, except at the first experiment, and amounting, in one ease, to 5°·5 on February 18. At the distance of 10 feet the change was very small.

From 9 feet to 11 feet, and also from 9 feet to 12 feet, the temperature decreased in the 4 feet column, and increased in the 10 feet column.

The highest temperature in the column of air, whose base was 4 feet from the fire, was in every instance, excepting at the first experiment, on February 20, when it was at 6 feet; and at the second experiment, on the same day, when it was at 3 feet on the floor; and the lowest was, with the exception of 4 instances, at 11 feet.

The highest temperature in the column at 10 feet from the fire was also on the floor, till the last four experiments; in the first of which both the floor and ceiling were of the same temperature, and higher than the whole body of air between; and in the remaining three, the temperature of the ceiling was somewhat higher than that on the floor. The lowest temperature, in this column, varied from 1 foot to 9 feet.

By taking the means of the daily experiments in every room, the next table is formed, showing the mean temperature of the floor at one place, and of the air at different levels, up to the height of 11 and 12 feet (the ceiling).

Wellington Barracks.—Determination of the Mean Daily Temperature of the Air in the Room at different Heights above the Floor, over a point 4 Feet from the Fire.

Year, Month, and Day.	Soldiers' Room.	External Air.	Room 6 Feet from Floor, 10 Feet from Fire.	MEAN READING OF THERMOMETERS PLACED.							
				Different Heights above the Floor in Feet.							
				0·0	1·0	2·0	3·0	6·0	9·0	11·0	12·0
1857:		*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
Feb. - 14	Room 25 -	42·8	51·5	60·7	59·9	61·2	61·0	56·8	53·6	53·7	
	Room 28 -	42·8	50·6	58·0	55·8	56·9	57·1	56·2	52·5	52·0	
Feb. - 16	Room 25 -	48·3	51·8	61·4	60·9	62·2	62·4	58·1	54·5	54·3	
	Room 28 -	48·8	51·4	59·4	57·2	58·4	58·8	56·0	53·0	52·4	
Feb. - 17	Room 25 -	49·4	55·3	62·9	62·3	63·9	64·3	60·3	57·6	57·0	
	Room 28 -	49·4	53·7	61·6	59·7	60·2	60·4	58·4	55·9	55·3	
Feb. - 18	Room 25 -	50·4	59·6	66·4	65·9	67·1	67·5	63·6	60·3	59·8	
	Room 26 -	50·4	55·7	61·5	59·9	60·2	60·2	56·7	55·1	54·8	
	Room 27 -	50·4	55·6	60·6	59·7	59·7	59·8	58·5	57·0	56·3	
	Room 28 -	50·4	57·2	64·5	62·6	62·9	63·0	60·2	58·0	57·8	
Feb. - 19	Room 25 -	46·5	57·7	63·2	61·7	63·2	63·6	61·1	60·8	58·5	
	Room 26 -	46·5	57·6	65·2	62·1	63·0	62·9	59·1	57·0	56·7	
	Room 27 -	46·5	56·7	64·7	63·4	62·9	62·4	59·0	57·6	57·1	
	Room 28 -	46·5	58·6	65·4	62·6	64·2	64·9	62·1	59·3	58·7	
Feb. - 20	Room 25 -	48·1	58·2	64·1	63·3	64·3	63·2	59·8	57·7	- -	59·7
	Room 26 -	48·1	58·8	70·7	67·5	68·0	67·3	62·2	58·9	57·8	
	Room 27 -	48·1	57·7	64·2	63·3	63·0	63·2	60·5	59·0	58·5	
	Room 28 -	48·1	58·6	65·4	62·4	63·6	64·0	61·9	59·9	- -	58·7
Feb. - 21	Room 25 -	47·7	57·2	61·6	61·1	62·3	62·9	60·3	58·2	- -	59·7
	Room 26 -	47·7	56·3	64·7	61·6	62·1	62·5	58·9	56·8	56·1	
	Room 27 -	47·7	57·6	66·1	65·3	65·6	64·9	61·6	59·9	59·2	
	Room 28 -	47·7	58·4	64·7	62·4	63·3	63·4	61·4	59·6	- -	60·8
	Room 32 -	47·7	55·7	55·9	56·5	56·0	55·7	56·1	56·1	55·3	
Feb. - 23	Room 25 -	48·7	56·6	61·1	60·9	61·9	62·5	59·5	57·4	- -	59·0
	Room 26 -	48·7	56·9	61·2	59·2	59·8	59·8	57·2	56·4	56·3	
	Room 27 -	48·7	58·0	64·8	64·5	65·1	64·9	61·2	58·9	58·4	
	Room 28 -	48·7	56·8	62·7	60·2	61·2	61·5	59·8	57·9	- -	59·3
	Room 32 -	48·7	54·8	55·0	56·5	55·3	54·9	55·2	55·3	55·7	
Feb. - 24	Room 25 -	45·9	56·4	62·2	61·5	62·4	63·0	57·9	57·4	- -	59·0
	Room 26 -	45·9	54·2	52·6	53·4	53·9	53·9	54·2	54·2	54·7	
	Room 27 -	45·9	58·3	65·6	65·7	66·1	66·2	64·8	55·6	58·8	
	Room 28 -	45·9	56·7	64·5	62·9	64·6	65·0	61·0	57·9	- -	58·7
	Room 32 -	45·9	44·5	54·6	56·5	54·8	54·7	54·9	55·1	55·5	
Mean Daily Temperature in the Room at different Heights above the Floor, 10 Feet from the Fire.											
Feb. - 26	Room 25 -	42·8	49·5	49·2	48·9	48·9	49·4	49·4	49·6	- -	50·6
	Room 26 -	42·8	50·0	49·8	49·1	49·2	49·8	50·1	50·5	- -	51·3
	Room 27 -	42·8	51·1	51·7	50·6	50·6	52·3	50·9	51·1	- -	51·7
	Room 28 -	42·8	50·1	52·2	50·4	50·3	50·3	50·4	50·1	- -	50·9
	Room 32 -	42·8	51·3	50·9	50·3	50·9	51·3	51·4	51·7	- -	52·1
Feb. - 27	Room 25 -	45·1	54·1	53·9	53·0	53·2	53·9	54·0	54·1	- -	55·7
	Room 26 -	45·1	52·8	51·2	50·2	52·1	50·7	52·1	51·9	- -	52·4
	Room 27 -	45·1	51·6	53·8	52·3	52·5	53·2	52·1	52·1	- -	53·6
	Room 28 -	45·1	54·2	56·6	54·2	54·3	54·6	54·6	54·3	- -	55·3
	Room 32 -	45·1	55·8	55·6	54·3	55·2	55·5	55·7	55·6	- -	55·6
Feb. - 28	Room 25 -	49·9	55·1	55·5	54·8	55·1	- -	55·7	55·6	55·8	57·3
	Room 26 -	49·9	57·1	56·6	56·1	56·6	- -	56·9	56·7	56·6	57·1
	Room 27 -	49·9	57·2	58·5	57·3	57·7	- -	57·9	57·9	58·7	59·5
	Room 28 -	49·9	56·3	58·8	56·4	56·5	- -	56·8	56·4	56·6	57·6
	Room 32 -	49·9	59·1	60·2	57·7	58·2	- -	58·7	58·7	58·8	58·7
Mar. - 2	Room 25 -	47·3	58·2	57·7	56·7	57·1	- -	57·8	57·9	58·1	59·9
	Room 26 -	47·3	56·4	56·3	55·6	55·6	- -	55·9	56·2	56·1	56·7
	Room 27 -	47·3	56·8	58·2	56·7	56·8	- -	57·5	57·5	57·4	58·7
	Room 28 -	47·3	56·1	57·9	56·2	56·3	- -	56·5	56·3	56·6	57·4
	Room 32 -	47·3	60·4	62·1	58·9	59·5	- -	60·3	60·3	60·7	60·6
Mar. - 3	Room 25 -	45·5	60·7	56·7	55·8	56·0	- -	57·1	57·1	57·3	58·7
	Room 26 -	45·5	53·1	52·3	52·2	52·5	- -	52·7	53·4	53·9	54·7
	Room 27 -	45·5	52·6	53·1	52·2	52·5	- -	52·5	52·9	53·0	53·0
	Room 28 -	45·5	57·4	58·2	56·9	57·3	- -	57·7	57·7	58·1	59·5
	Room 32 -	45·5	59·9	63·4	58·1	58·6	- -	59·2	59·4	59·5	59·8

Wellington Barracks.—Soldiers' Rooms.

Discussion of the Mean Daily Results of Experiments for the Determination of the Mean Temperature of the Air at different Distances from the Fire and different Heights above the Floor, in Rooms 25, 26, 27 and 28.

Feb. 14.—At the distance of 4 feet from the fire, the temperature of the air, at the level of 1 foot above the floor, was 0°·8 in room 25, and 2°·2 in room 28 lower than on the floor beneath; from the level of 1 foot to 2 feet there was an increase slightly exceeding 1° in both rooms; from 2 to 3 feet, the change was small; a decrease of 4°·2 and of 0°·9 took place from the level of 3 to that of 6 feet in rooms 25 and 28 respectively; a further decrease, exceeding 3°, took place from 6 to 9 feet; and at 11 feet the temperature exceeded, in room 25, that at 9 feet by 0°·1, and was less by 0°·5 in room 28. The highest temperature in the column in room 25 was 61°·2, and in that of room 28 was 57°·1. The difference of temperature in the column of air, in room 25, was 7°·6, and in room 28 was 5°·1.

Feb. 16.—The temperature at the distance of 4 feet from the fire, at the level of 1 foot above the floor, was 0°·5 in room 25, and 2°·2 in room 28, lower than on the floor; an increase took place from the level of 1 foot to 3 feet, amounting to 1°·5 in room 25 and 1°·6 in room 28; from 3 feet to 6 feet, there was a decrease of 4°·3 in room 25, and of 2°·8 in room 28; and a further decrease took place of 3°·6 and 3°·0 respectively in rooms 25 and 28, from 6 to 9 feet; from 9 to 11 feet the change was small, there being a decrease of 0°·2 in room 25, and of 0°·6 in room 28. The highest temperature in the column in room 25 was 62°·4, and in room 28 was 58°·8. The difference of temperature in the column of air in room 25 amounted to 8°·1, and in room 28 to 6°·4.

Feb. 17.—At the distance of 4 feet from the fire the temperature, at the height of 1 foot above the floor, decreased 0°·6 in room 25 and 1°·9 in room 28, as compared with that on the floor; from 1 foot to 3 feet there was a slight increase; and above the height of 3 feet there was a decrease, amounting to 7°·3 in room 25, and 5°·1 in room 28. The highest temperature in the column of air in room 25 was 64°·3, and in room 28 was 60°·4. The difference of temperature in the column of air in room 25 was 7°·3, and in room 28 was 5°·1.

Feb. 18.—The temperature at 4 feet from the fire, at the height of 1 foot above the floor, was 0°·5 in room 25, and 1°·9 in room 28, lower than on the floor; there was a slight increase up to 3 feet in all the rooms; and above 3 feet a decrease, amounting to 7°·7 in room 25, to 5°·4 in room 26, to 3°·5 in room 27, and to 3°·7 in room 28. The highest temperature in the column of air in room 25 was 67°·5, in room 26 was 60°·2, in room 27 was 59°·8, and in room 28 was 63°·0. The difference of temperature in the column of air to 11 feet was 7°·3, 5°·4, 3°·5, and 5°·7 respectively in rooms 25, 26, 27 and 28.

Feb. 19. At 4 feet from the fire the temperature, at the height of 1 foot above the floor, was 1°·3 in room 27, and 3°·1 in room 26, lower than on the floor; from 1 to 2 feet there was a slight increase in rooms 25, 26 and 28; and a decrease in room 27 of ½ a degree; from 2 to 3 feet there was an increase of 0°·4 in room 25, and of 0°·7 in room 28; whilst in rooms 26 and 27, there was a decrease of 0°·1 and 0°·5 respectively; above the height of 3 feet there was a universal decrease, which in room 25 amounted to 5°·1, in room 26 to 6°·2, in room 27 to 5°·3, and in room 28 to 6°·2. In the column of air in room 25 the highest temperature was 63°·6, in room 26 was 63°·0, in room 27 was 63°·4, and in room 28 was 64°·9. The difference of temperature amounted to 5°·1, 6°·3, 6°·3, and 6°·2 in rooms 25, 26, 27, and 28 respectively.

Feb. 20.—The temperature at 4 feet from the fire, at the level of 7 foot above the floor, was from 0°·8 in room 25, and from 3°·2 in room 26, lower than on the floor; from 1 foot to 2 feet there was a slight increase in the rooms, with the exception of No. 27, where there was a decrease of 0°·3; from 2 feet to 3 feet there was a decrease in rooms 25 and 26, and a slight increase in rooms 27 and 28; from 3 feet to 9 feet there was a decrease amounting to 5°·5, 8°·4, 4°·2, and 4°·1 in rooms 25, 26, 27 and 28 respectively; and from 9 feet to 11 feet, in rooms 26 and 27, there was a decrease of 1°·1 and 0°·5 respectively; and from 9 feet to 12 feet, an increase of 2°·0 was observed in room 25, and a decrease of 1°·2 in room 28. The highest temperature in the column of air was 64°·3, 68°·0, 63°·3, and 64° 0 in rooms 25, 26, 27 and 28 respectively; and the difference of temperature amounted to 6°·6 in room 25, to 10°·2 in room 26, to 4°·8 in room 27, and to 5°·3 in room 28.

Feb. 21.—The temperature at 4 feet from the fire, at the height of 1 foot above the floor, was from 0°·5 in room 25, to 3°·1 in room 26, lower than on the floor; from 1 foot to 2 feet there was a slight increase in all the rooms; and from 2 feet to 3 feet there was an increase of 0°·6, 0°·4, and 0°·1, in rooms 25, 26 and 28 respectively, and a decrease of 0°·7 in room 27; from 3 feet to 9 feet the decrease was universal, amounting to 4°·7, 5°·7, and 5°·0 respectively; and in rooms 26 and 27 there was a further decrease of 0°·7 in each, from 9 feet to 11 feet; whilst from 9 feet to 12 feet, in rooms 25 and 28, an increase of 1°·5 and 1°·2 respectively took place. The highest temperature in the column of air in room 25 was 62°·9, in room 26 was 62°·5, in room 27 was 65°·6, and in room 28 was 63°·4. The difference of temperature amounted to 4°·7, 6°·4, 6°·4, and 3°·8, in rooms 25, 26, 27 and 28 respectively.

Feb. 23.—At 4 feet from the fire, the temperature at 1 foot in height was from 0°·2 in room 25, to 2°·5 in room 28, lower than on the floor; and from 1 foot to 3 feet, an increase of temperature nearly always manifested itself; from 3 feet to 9 feet in rooms 25 and 28, and from 3 feet to 11 feet in rooms 26 and 27, there was an universal decrease, amounting to 4°·7 and 3°·8 in the two former, and to 6°·4 and 5°·7 in the two latter rooms. From 9 feet to 12 feet there was an increase of 1°·6 in room 25, and of 1°·4 in room 28. In the column of air, the highest temperatures were 62°·5, 59°·8, 65°·1, and 61°·5; and the differences of temperature were 5°·1, 3°·5, 6°·7, and 3°·6, in rooms 25, 26, 27 and 28 respectively.

Feb. 24.—The temperature at 4 feet from the fire, at the height of 1 foot above the floor in room 25, was 0°·7, and in room 28 was 1°·6 lower than on the floor; but in room 26 it was 0°·8, and in room 27 was 0°·1, higher than on the floor; from 1 foot to 3 feet there was an increase in all the rooms; and from 3 feet to 9 feet there was a decrease amounting to 5°·6 in room 25, to 10°·6 in room 27, and to 7°·1 in room 28, and an increase of 0°·3 in room 26; from 9 feet to 11 feet in rooms 26 and 27, and from 9 to 12 feet in rooms 25 and 28, there was an increase of temperature amounting to 0°·5 and 3°·2 respectively in the two former rooms; and to 1°·6 and 0°·8 respectively in the two latter. The highest temperature in the column of air was 63°·0 in room 25, 54°·7 in room 26, 66°·2 in room 27, and 65°·0 in room 28; whilst the differences of temperature were 5°·6, 1°·3, 10°·6, and 7°·1 respectively.

Feb. 26.—At the distance of 10 feet from the fire, the temperature at the height of 1 foot above the floor was from 0°·3 in room 25 to 1°·8 in room 28, lower than on the floor; and from 1 foot to the ceiling there was generally a gradual increase of temperature amounting to 1°·7 in room 25, to 2°·2 in room 26, to 1°·1 in room 27, and to 0°·5 only in room 28. The highest temperature in the column of air was 50°·6 in room 25, 51°·3 in room 26, 52°·3 in room 27, and 50°·9 in room 28; and the differences of temperature were 1°·7, 2°·1, 1°·7, and 0°·6 in rooms 25, 26, 27 and 28 respectively.

Feb. 27.—The temperature at 10 feet from the fire, 1 foot in height, varied from 0°·9 in room 25, to 2°·4 in room 28, lower than on the floor; from 1 foot to 3 feet there was a general increase in all the rooms; from 3 to 6 feet there was an increase of 0°·1 in room 25, and 1° 4 in room 26, and a decrease of 1°·1 in room 27; from 6 feet to 12 feet an increase of 1°·7 was observed in room 25; and from 6 feet to 9 feet in rooms 26 and 28 there was a slight decrease; but from 9 feet to 12 feet the temperature increased 0°·5 in room 26, 1°·5 in room 27, and 1°·0 in room 28. In the column of air, the highest temperature was 55°·7, 52°·4, 53°·6, and 55°·3 in the rooms 25, 26, 27, and 28 respectively, and the difference of temperature amounted to 2°·7, 2°·2, 1°·5, and 1°·1 respectively.

Feb. 28.—At 10 feet from the fire, the temperature at the height of 1 foot from the floor, varied from 0°·5 in room 26 to 2°·4 in room 28, lower than on the floor. From 1 foot to the ceiling there was a gradual increase of temperature amounting to 2°·5 in room 25, to 1°·0 in room 26, to 2°·3 in room 27, and to 1°·2 in room 28. The highest temperature in the column of air was 57°·3 in room 25, 57°·1 in room 26, 59°·5 in room 27, and 57°·6 in room 28; and the difference of temperature amounted to 2°·5, 1°·0, 2°·2, and 1°·2 in rooms 25, 26, 27, and 28 respectively.

March 2.—The temperature at 10 feet from the fire, at the level of 1 foot above the floor, varied from 0°·7 in room 26, to 1°·7 in room 28, lower than on the floor. From the height of 1 foot to the ceiling, there was an almost universal and gradual increase of temperature, amounting to 3°·2, 1°·1, 2°·0, and 1°·2 in rooms 25, 26, 27, and 28 respectively. The highest temperature in the column of air was 59°·9 in room 25, 56°·7 in room 26, 58°·7 in room 27, and 57°·4 in room 28; and the difference of temperature was respectively 3°·2, 1°·1, 2°·0, and 1°·2.

March 3.—At 10 feet from the fire, the temperature at the height of 1 foot above the floor, varied from 0°·1 in room 26 to 1°·3 in room 28, lower than on the floor; and from the height of 1 foot to the ceiling there was a universal increase of temperature amounting to 2°·9 in room 25, to 2°·5 in room 26, to 0°·8 in room 27; and to 2°·6 in room 28. The highest temperature in the column of air was 58°·7 in room 25, 54°·7 in room 26, 53°·0 in room 27, and 59°·5 in room 28; and the difference of temperature was respectively 2°·9, 2°·5, 0°·8, and 2°·6.

Wellington Barracks.—Determination of the Mean Daily Temperature of the Air on the Walls and Floor in the different Rooms.

Year, Month, and Day.	Soldiers' Rooms.	MEAN READING OF THERMOMETERS, PLACED						
		North Wall.	South Wall.	West Wall.	East Wall.	On the Floor:		
						13 Feet N. E. from Fire.	20 Feet N. W. from Fire.	
1857:		*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	
Feb. - 14	Room 25 -	49·0	48·7	49·2	48·5	48·4	48·4	
	Room 28 -	49·4	49·5	48·5	49·5	51·1	50·0	
Feb. - 16	Room 25 -	49·3	48·7	49·5	48·5	48·9	48·8	
	Room 28 -	49·1	49·8	48·7	49·6	51·5	50·0	
Feb. - 17	Room 25 -	52·6	51·6	52·5	51·7	51·8	51·7	
	Room 28 -	51·7	52·8	51·8	52·1	54·4	53·1	
Feb. - 18	Room 25 -	56·5	54·2	53·3	55·9	55·4	55·1	
	Room 26 -	- -	53·0	54·2	53·1	53·7	53·7	
	Room 27 -	54·0	53·9	53·2	54·7	54·9	54·8	
	Room 28 -	55·6	55·4	55·1	55·1	57·4	55·4	
Feb. - 19	Room 25 -	55·8	55·3	55·1	55·6	54·7	54·8	
	Room 26 -	- -	55·1	55·6	54·6	55·1	54·3	
	Room 27 -	55·8	55·6	54·7	55·9	55·0	54·7	
	Room 28 -	56·7	57·0	55·8	56·5	58·6	57·0	
Feb. - 20	Room 25 -	55·8	55·4	55·5	55·1	54·9	55·1	
	Room 26 -	- -	55·7	56·6	55·3	54·6	54·3	
	Room 27 -	56·9	56·2	55·3	56·7	56·6	56·7	
	Room 28 -	56·8	58·2	56·2	56·8	58·7	57·8	
Feb. - 21	Room 25 -	55·1	54·3	55·3	54·4	54·1	54·5	
	Room 26 -	- -	54·5	55·3	53·9	54·6	54·1	
	Room 27 -	57·3	56·8	55·8	57·4	56·2	57·2	
	Room 28 -	56·8	58·2	56·2	56·8	58·5	57·7	
Feb. - 23	Room 25 -	54·3	54·2	54·2	53·5	53·5	53·5	
	Room 26 -	- -	54·4	55·0	54·0	54·2	53·7	
	Room 27 -	57·0	56·5	55·8	56·6	55·7	56·7	
	Room 28 -	55·2	56·3	54·6	55·1	56·9	55·7	
Feb. - 24	Room 25 -	54·2	53·8	54·2	53·5	53·5	53·4	
	Room 26 -	- -	52·6	54·1	53·0	52·4	52·6	
	Room 27 -	56·4	56·2	55·3	56·7	57·3	56·4	
	Room 28 -	54·8	55·6	54·2	54·8	56·8	55·2	
Feb. - 26	Room 25 -	48·2	- -	49·4	48·1	48·0	49·1	
	Room 26 -	- -	48·4	50·7	49·3	48·6	49·8	No Fire.
	Room 27 -	- -	49·4	50·2	51·3	50·4	50·9	
	Room 28 -	49·1	- -	49·1	50·0	50·7	50·6	
	Room 32 -	50·6	- -	52·9	51·8	50·3	50·7	
Feb. - 27	Room 25 -	51·0	- -	51·3	50·2	50·1	51·3	
	Room 26 -	- -	50·1	52·0	49·8	49·6	50·7	
	Room 27 -	- -	50·7	51·3	51·7	50·7	51·7	
	Room 28 -	51·9	- -	51·1	51·9	52·9	52·9	
	Room 32 -	53·3	- -	54·9	53·6	52·7	52·9	
Feb. - 28	Room 25 -	53·6	- -	53·2	52·4	52·2	52·9	
	Room 26 -	- -	54·2	55·1	53·9	53·6	56·0	
	Room 27 -	- -	55·5	54·4	55·6	55·3	55·9	
	Room 28 -	54·4	- -	53·5	53·9	55·2	54·7	
	Room 32 -	56·7	- -	57·1	53·6	55·7	55·9	
March 2	Room 25 -	55·5	- -	54·8	54·1	53·7	54·8	
	Room 26 -	- -	54·7	55·1	53·8	53·4	54·0	
	Room 27 -	- -	55·5	54·2	55·4	54·8	55·4	
	Room 28 -	54·7	- -	54·1	54·5	55·4	55·2	
	Room 32 -	58·3	- -	59·6	58·0	57·4	57·4	
March 3	Room 25 -	55·3	- -	55·0	54·3	53·7	54·0	
	Room 26 -	- -	52·0	53·0	52·0	51·5	52·0	
	Room 27 -	- -	52·0	52·0	52·9	52·0	52·4	
	Room 28 -	56·5	- -	55·2	55·7	55·7	55·9	
	Room 32 -	58·1	- -	59·0	58·0	57·5	57·8	

Wellington Barracks.—Soldiers' Rooms.

Discussion of the Mean Daily Results of the Experiments for the Determination of the Temperature at different parts of the Room, in Rooms 25, 26, 27, and 28.

Feb. 14.—The walls of both rooms, 25 and 28, were below the temperature of the air of the rooms; in room 25, the defect varied from 2°·3 at the west to 3°·0 at the east wall; and in room 28, from 1°·1 at the south and east walls to 2°·1 at the west wall.

Feb. 16.—The walls of both rooms were lower in temperature than that of the centre of room, which was 51°·8 and 51°·4 in rooms 25 and 28 respectively. The defect in room 25 varied from 2°·3 at the west to 3°·3 at the east wall, and in room 28 from 1°·8 at the east wall to 2°·7 at the west wall.

Feb. 17.—The temperature of the air of the rooms 25 and 28 exceeded that of the walls. In room 25 the walls varied from 2°·7 at the north to 3°·7 at the south wall, below the temperature of the room; and in room 28 the variation was from 0°·9 at the south to 2°·0 at the north wall.

Feb. 18.—The walls in the four rooms were all at a lower temperature than the air of the room; in room 25, with the temperature at the centre 59°·6, it varied from 56°·5 at the north wall to 53°·3 at the east wall; in room 26, the temperature at the centre of room being 55°·7, it varied from 54°·2 at the west wall to 53°·0 at the south wall; in room 27, the room temperature being 55°·6, it varied from 54°·7 at the east wall to 53°·2 at the west wall; and in room 28, the temperature of room being 57°·2, it varied from 55°·6 at the north wall to 55°·1 at the west and east walls.

Feb. 19.—The walls were lower in temperature in every room than the air of the room; in room 25, with the temperature of the air of the room 57°·7, it varied from 55°·8 at the north wall to 55°·1 at the west wall; in room 26, the defect varied from 2°·0 at the west wall to 3°·0 at the east wall; in room 27, from 0°·9 at the north wall to 2°·0 at the west wall; and in room 28, from 1°·6 at the south wall to 2°·8 at the west wall.

Feb. 20.—The temperature of the walls was lower in all the rooms than that of the air of the room. In room 25, the room temperature was 58°·2, and the temperature varied from 55°·8 at the north wall to 55°·1 at the east wall; and the defect in room 26 varied from 2°·2 at the west wall to 3°·5 at the east wall; in room 27, from 0°·8 at the north wall to 2°·4 at the west wall; and in room 28, from 0°·4 at the south wall to 2°·4 at the west wall.

Feb. 21.—In the four rooms the temperature of the walls was lower than that of the air. In room 25, the temperature of the air of the room being 57°·2, it varied from 55°·3 at the west wall to 54°·3 at the south wall; the defect in room 26 varied from 1°·0 at the west wall to 2°·4 at the east wall; in room 27, from 0°·3 at the north wall to 1°·8 at the west wall; and in room 28, from 0°·2 at the south wall to 2°·2 at the west wall.

Feb. 23.—The average temperatures of the four rooms were all below that of the air, the defect varying in room 25 from 2°·3 at the north wall to 3°·1 at the east wall; in room 26, from 1°·3 at the west wall to 2°·9 at the east wall; in room 27, from 1°·0 at the north wall to 2°·2 at the west wall; and in room 28, from 0°·5 at the south to 2° 2 at the west wall.

Feb. 24.—The mean temperature of the north and south walls was lower than that of the room, but the east and west walls were higher in temperature. In room 25, the temperature varied from 0°·4 in excess at the west wall to 2°·6 in defect at the south wall; in room 26, it varied from 1°·5 in excess at the west wall to 1°·6 in defect at the south wall; in room 27, from 1°·4 in excess at the east wall to 2°·1 in defect at the south wall; and in room 28, from 0°·6 in excess at the east wall to 1°·9 in defect at the north wall.

Feb. 26.—The walls were generally lower in temperature than the air of the room, but that of the west and east walls was occasionally higher. In room 25, the temperature varied from 0°·1 at the west wall to 1°·4 at the east wall, in defect of the air in the room. In room 26, from 0°·7 at the west wall in excess to 1°·6 in defect at the south wall; in room 27, from 0°·2 in excess at the east wall to 1°·7 in defect at the south wall; and in room 28, from 0°·1 at the east wall to 1°·0 at the north and west walls in defect.

Feb. 27.—The mean temperature of the walls was lower than that of the room. In room 25, the defect varied from 2°·8 at the west wall to 3°·9 at the east wall; in room 26, from 0°·8 at the west wall to 3°·0 at the east wall; in room 27, from 0°·1 in excess at the east wall to 0°·9 in defect at the west wall; and in room 28, from 2°·3 at the north and east walls to 3°·1 at the west wall in defect.

Feb. 28.—In all the rooms, the mean temperature of the walls was lower than that of the air in the rooms. In room 25, the defect varied from 1°·5 at the north wall to 2°·7 at the east wall; in room 26, from 2°·0 at the west wall to 3°·2 at the east wall; in room 27, from 1°·6 at the east wall to 2°·8 at the west wall; and in room 28, from 1°·9 at the north wall to 2°·8 at the west wall.

March 2.—The mean temperature of the walls was lower in all the rooms; the defect varied from 2°·7 at the north wall to 4°·1 at the east wall in room 25; from 1°·3 at the west wall to 2°·6 at the east wall in room 26; from 1°·3 at the south wall to 2°·6 at the west wall in room 27; and from 1°·4 at the north wall to 2°·0 at the west wall in room 28.

March 3.—The mean temperature of the walls was again generally lower than that of the air. In room 25, the defect varied from 5°·4 at the north wall to 6°·4 at the east wall; in room 26, from 0°·1 at the west wall to 1°·1 at the south and east walls; in room 27, from 0°·3 in excess at the east wall to 0°·6 in defect at the south and west walls; and in room 28, from 0°·9 at the north wall to 2°·2 at the west wall in defect.

WELLINGTON BARRACKS.—SOLDIERS' ROOMS.

Discussion of the Mean Daily Results of Experiments for the Determination of the Temperature on the Floor at different Distances from the Fire, in Rooms 25, 26, 27, and 28.

Feb. 14.—The temperature of the floor in room 25, at the distance of 4 feet from the fire, was 9°·2 above the temperature of the air of the room, and was 3°·1 below, at points 13 feet north-east and 20 feet north-west from the fire. In room 28, at 4 feet from the fire, it was 7°·4; and at 13 feet north-east, was 0°·3 above; and at 20 feet north-west, was 0°·6 below the temperature of the room.

Feb. 16.—In room 25, at the distance of 4 feet from the fire, the temperature of the floor was 9°·6 above, and at 13 feet north-east was 2°·9, and at 20 feet north-west was 3°·0 below the temperature of the air of the room. In room 28, at 4 feet distance from the fire, the temperature of the floor was 8°, and at 13 feet north-east, was 0°·1 in excess, whilst at 20 feet north-west it was 1°·4 in defect of the temperature of the room.

Feb. 17.—At 4 feet from the fire, in room 25, the floor temperature was 7°·6 in excess; and at 13 feet north-east, and 20 feet north-west from the fire, it was respectively 3°·5 and 3°·6 in defect of the temperature of the room. In room 38, 28, at 4 feet from the fire, it was 7°·9, and at 13 feet north-east, was 0°·7 in excess; and at 20 feet north-west, was 0°·6 below the temperature of the room.

Feb. 18.—At the distance of 4 feet from the fire, the mean temperature of the floor exceeded that of the air in the room by 6°·8, 5°·8, 5°·0, and 7°·3 in rooms 25, 26, 27, and 28 respectively; at 13 feet north-east from the fire in room 28, it was 0°·2 higher; and was 0°·7, 2°·0, and 4°·2 lower in rooms 27, 26 and 25 respectively; and at the distance of 20 feet north-west it was 0°·8 lower in room 27, 1°·8 in room 28, 2°·0 in room 26, and 4°·5 in room 25.

Feb. 19.—The temperature of the floor exceeded that of the air in the room, at 4 feet from the fire, by 5°·5, 7°·6, 8°·0, and 6°·8 in rooms 25, 26, 27, and 28 respectively; at 13 feet north-east from the fire, it was of the same value in room 28; and was 1°·7, 2°·5, and 3°·0 lower in rooms 27, 26, and 25 respectively; and at the distance of 20 feet north-west it was 1°·6 lower in room 28, 2°·0 in room 27, 3°·3 in room 26, and 2°·9 in room 25.

Feb. 20.—At 4 feet from the fire, the excess of the temperature of the floor over that of the air in the room was 5°·9 in room 25, 11°·9 in room 26, 6°·5 in room 27, and 6°·8 in room 28; at 13 feet north-east from the fire, in room 28, the excess was 0°·1; but was 1°·1, 4°·2, and 3°·3 in defect in rooms 27, 26, and 25 respectively; and at the distance of 20 feet north-west it was 0°·8 in defect in room 28, 1°·0 in room 27, 3°·1 in room 25, and 4°·5 in room 26.

Feb. 21.—The temperature of the floor was in excess of that of the room, at 4 feet from the fire, by 4°·4 in room 25, 8°·4 in room 26, 8°·5 in room 27, and 6°·3 in room 28; at 13 feet north-east from the fire in room 28, it was 0°·1 in excess; and in rooms 27, 26, and 25, it was 1°·4, 1°·7, and 3°·1 in defect respectively. At 20 feet north-west from the fire it was in defect in all the rooms, being 1°·1, 1°·3, 3°·1, and 3°·2 respectively in defect in rooms 28, 27, 25, and 26.

Feb. 23.—At 4 feet from the fire the excess of the temperature of the floor, over that of the air in the room. was 4°·5, 4°·3, 6°·8, and 5°·9 in rooms 25, 26, 27, and 28 respectively; at 13 feet north-east from the fire, the floor temperature was 0°·1, 2°·3, 2°·7 and 3°·1 in defect in rooms 28, 27, 26, and 25 respectively; and at 20 feet north-west from the fire, was 1°·1, 1°·3, 3°·1 and 3°·2 in defect, in rooms 28, 27, 25, and 26 respectively.

Feb. 24.—At 4 feet from the fire, the temperature of the floor was in excess of that of the air of the room by 5°·8, 7°·3, and 7°·8 respectively in rooms 25, 27, and 28; and in defect in room 26 by 1°·6. At 13 feet north-east from the fire, the floor temperature was 0°·6 and 2°·0 in excess in rooms 27 and 28 respectively; and was of the same value in room 25, and 0°·6 in defect in room 26. At 20 feet north-west, the defect was 1°·6, 0°·9, and 0°·1 respectively in rooms 28, 27, and 25; and the excess was 0°·2 in room 26.

Feb. 26.—At the distance of 10 feet from the fire, the mean temperature of the floor exceeded that of the air by 0°·6 in room 27, and by 2°·1 in room 28; and was 0°·3 and 0°·2 in defect in rooms 25 and 26 respectively. At 13 feet north-east from the fire, the floor temperature was in excess in room 28 by 0°·6; and in defect in rooms 25, 26, and 27 by 1°·5, 1°·4, and 0°·7 respectively; and at 20 feet north-west it was 0°·5 in excess in room 28, and 0°·4, 0°·2, and 0°·2 respectively in defect in rooms 25, 26, and 27.

Feb. 27.—The mean temperature of the floor at 10 feet from the fire was in excess of that of the air of the room by 2°·2 in room 27, and 2°·4 in room 28; and in defect by 0°·2 in room 25, and 1°·6 in room 26. At 13 feet north-east from the fire it was in defect by 4°·0, 3°·2, 0°·9, and 1°·3 in rooms 25, 26, 27, and 28 respectively; and at 20 feet north-west it was 0°·1 in excess in room 27, and 2°·8, 2°·1, and 1°·3 in defect in rooms 25, 26, and 28 respectively.

Feb. 28.—At 10 feet from the fire the mean temperature of the floor exceeded that of the air by 0°·4, 1°·3, and 2°·5, in rooms 25, 27, and 28 respectively; but was in defect by 0°·5 in room 26. At the distance of 13 feet north-east from the fire it was 3°·5, 2°·9, 1°·9, and 1°·1 in defect in rooms 26, 25, 27, and 28 respectively; and at 20 feet north-west from the fire it was in defect by

2°·2 in room 25, by 1°·6 in room 28, by 1°·3 in room 27, and by 1°·1 in room 26.

March 2.—The mean temperature of the floor, at 10 feet from the fire, was above that of the air in the room, in rooms 27 and 28, by 1°·4 and 1°·8 respectively; and was below in rooms 25 and 26 by 0°·5 and 0°·1 respectively. At 13 feet north-east from the fire it was 4°·5, 3°·0, 2°·0, and 0°.7 below, in rooms 25, 26, 27, and 28 respectively; and at 20 feet north-west from the fire it was 3°·4, 2°·4, 1°·4, and 1°·1 below in rooms 25, 26, 27, and 28 respectively.

March 3.—At 10 feet from the fire, the mean temperature of the floor exceeded that of the air by 0°·5 and 0°·8 respectively, in rooms 27 and 28; and was in defect in rooms 25 and 26 by 4°·0 and 0°·8 respectively. At 13 feet north-east from the fire it was 7°·0, 1°·6, 0°·6, and 1°·7 below in rooms 25, 26, 27, and 28 respectively; and at 20 feet north-west from the fire, it was 6°·7, 1°·1, 0° 2, and 1°·5 lower respectively.

The following is a brief Summary of the Results of the Experiments at the Wellington Barracks.

I. On the Temperature of the Air and Walls of the different Rooms.

Group 1.—Soldiers' Rooms, 25 and 28.

Position of the Instruments.	Room 25. Bailey's Arnott's Stove.	Room 28. Edwards's Arnott's Stove.	Mean.
	Degrees.	*Degrees.*	*Degrees.*
External air - - - - - - - -	47·0	47·0	47·0
Centre of room - - - - - - -	52·9	51·9	52·4
North wall, opposite fire - - - - -	50·3	50·1	50·2
South wall, same side as fire - - - - -	49·7	50·7	50·2
Wall adjacent to other buildings - - - -	50·4	50·4	50·4
„ passage - - - - - -	49·6	49·6	49·6
Floor, 4 feet from fire - - - - - - -	61·7	59·7	60·7
„ 13 „ - - - - - - -	49·7	52·3	51·0
„ 20 „ - - - - - - -	49·6	51·0	50·3
Air, 1 foot above a point on the floor, 4 feet from fire	61·0	57·6	59·3
„ 2 „ „ - - - - - -	62·4	58·5	60·5
„ 3 „ „ - - - - - -	62·6	58·8	60·7
„ 6 „ „ - - - - - -	58·4	56·9	57·6
„ 9 „ „ - - - - - -	55·2	53·8	54·5
„ 11 „ „ - - - - - -	55·0	53·2	54·1

The air at the centre of the room, heated by Bayley's Arnott's stove, was 5°·9, and that by Edwards' Arnott's stove 4·9° warmer than the external atmosphere.

The floor of room 28, beyond the immediate influence of the fire, was 2°½ warmer than in room 25, at 20 feet from the fire, being lower in temperature than the air at the centre of the room, by less than 1° in room 28, and by as much as 3° in room 25. The small excess of temperature at the centre of room 25 over that of the external atmosphere, decreased from 5°·9 to 3°·3, on approaching the north and west walls, and to 2°·7 on approaching the south and east walls. The heat was much better diffused in room 28 than in room 25, and the general body of the air was warmer, notwithstanding that the latter was occupied by the observer day and night.

GROUP 2.—Soldiers' Rooms, 25, 26, 27 and 28.

Position of the Instruments.	Room 25. Bayley's Arnott's Stove.	Room 26. Ordnance Stove.	Room 27. Lee Stevens' Stove.	Room 28. Edwards's Arnott's Stove.	Mean.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*	*Degrees.*
External air - - - -	47·9	47 9	47·9	47·9	47·9
Temperature of room - - -	57·6	56·6	57·3	56·4	56·9
Wall opposite fire - - -	54·1	53·2	54·4	54·8	54·1
Wall same side as fire - -	54·5	- -	56·2	56·7	55·8
Wall adjacent to buildings - -	53·8	54·3	55·0	54·7	54·4
Wall adjacent to passage - -	53·3	53·0	53·8	54·1	53·3
Floor, 4 feet from fire - -	63·1	62·6	64·3	64·4	63·6
„ 13 „ N. E. from fire -	53·1	53·0	54·4	56·1	54·1
„ 20 „ N. W. from fire -	53·5	53·3	54·9	55·3	53·7
Air, 1 foot - - - - -	62·4	60·6	63·6	62·2	62·2
„ 2 feet - - - - -	63·5	61·1	63·7	63·3	62·9
„ 3 „ - - above a point on	63·8	61·1	63·6	63·6	63·0
„ 6 „ the floor, 4 feet from	60·7	58·0	60·9	61·2	60·2
„ 9 „ fire - - -	58·6	56·4	58·7	58·8	58·1
„ 11 „ - - - - -	58·2	56·1	58·0	58·1	57·6
„ 12 „ - - - - -	60·3	- -	- -	59·9	60·1

The mean increase of temperature over the external air is 9° at the centre of the rooms; 6°·3 on the walls opposite to the fire, and adjacent to other buildings; 5°·4 on the walls adjacent to the passage, and 7°·9 on the wall on the same side as the fire.

The temperature of the centre of the rooms 25, 26, 27 and 28, exceeded that of the external air by 9°·7, 8°·7, 9°·4, and 8°·5 respectively.

The temperature of the walls of room 25, beyond the influence of the fire, was 3°; of room 26 was 2°½; and of room 27 1°¼ below that of the centre of the room.

The ceilings of the several rooms, over a point 4 feet from the fire, were about 6° warmer than the walls.

The general body of the air of the room was about 56° in room 25; was 55°½ in room 26; was 56°¼ in room 27; and was 56°¾ in room 28. A mass of air equal to 800 cubic feet was cooled 1 degree per minute, in each of the rooms, by the cooling influence of the windows.

Room 28 was, therefore, warmer, and the heat was much better diffused than in any of the other rooms.

GROUP 3.—Soldiers Rooms 25, 26, 27, 28 and 32.

Position of the Instruments.	Room 25. Bayley's Arnott's Stove.	Room 26. Ordnance Stove.	Room 27. Lee Stevens' Stove.	Room 28. Edwards's Arnott's Stove.	Room 32. Jeake's Stove.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*	*Degrees.*
External air - - - -	46·1	46·1	46·1	46·1	46·1
Centre of room - - - -	55·5	53·8	53·8	54·8	57·2
Wall opposite fire - - -	53·8	52·7	53·3	54·4	56·6
Wall adjacent to other buildings -	53·6	53·8	53·9	54·0	56·5
Wall adjacent to passage - -	52·7	52·4	52·9	53·5	57·8
Floor, 10 feet from fire - -	54·6	53·2	55·0	56·7	58·4
„ 13 „ N. E. - - -	52·4	54·0	53·2	54·8	55·8
„ 20 „ N. W. - - -	53·0	53·0	53·8	54·7	56·0
Air, 1 foot - - - - -	53·8	52·6	53·3	54·8	55·8
„ 2 feet -- above a point on	54·1	53·2	54·0	54·9	56·5
„ 6 „ the floor, 10 feet	54·8	53·5	54·2	55·2	57·1
„ 9 „ from the fire	54·8	53·7	54·3	54·9	57·1
„ 11 „	55·0	53·8	54·5	55·2	57·3
„ 12 „ - - - - -	56·4	57·4	55·3	56·1	57·3

The temperature at the centre of the room exceeded that of external air by 9°·4, 7°·7, 7°·7, 8°·7, and 11°·1 in rooms 25 to 32 respectively.

The floor of room 25, as determined from the temperature at three points, 10, 13, and 20 feet from the fire, was 2°·2 below; of room 26, was 0°·4 below; of room 32, was 0°·5 below; of room 27, was 0°·2 above; and of room 28, was 0°·7 above that of the centre of the room.

The walls were 3°·1, 1°·5, 0°·9, 1°·8, and 1°·3 below that at the centre of the rooms respectively.

The centre of the ceiling of room 25, was 1°·4; of room 26, was 3°·6; of room 27, was 0°·8; of room 28, was 0°·9; and of room 32, was 0°·0 above the temperature at 11 feet above the floor; and was about 3° above the temperature of the walls and floor of rooms 25 and 26; 2° above that of room 27, and 1°·5 of room 28.

The general body of the air in room 25 was 53°·9; in room 26, was 53°; in room 27, was 53°; in room 28, was 53°·9; and in room 32, was 56°·5.

About 730 cubic feet of air was cooled one degree per minute in each of the rooms by the cooling influence of the windows.

Omitting as we must, room 32 from the comparison, the general body of air in room 28 was as warm as in room 25, notwithstanding the presence of the observer in the latter.

II. EXPERIMENTS on the Hygrometrical States of the Air.

GROUP 1.

Subjects of Investigation.	External Air.	Room 25.	Room 28.
	Deg.	*Deg.*	*Deg.*
Temperature of evaporation - - - - - - -	43·7	48·2	46·8
Difference between air and evaporation temperature -	3·3	4·7	5·1
Temperature of dew-point - - - - - -	39·8	42·3	41·7
Difference of air and dew-point temperature - - -	7·2	10·6	10·2
Elastic force of vapour - - - - - - -	0·248 in.	0·270 in.	0·264 in.
Weight in grains of water in a cubic foot of air - -	2·9	3·1	3·0
Grains short of saturation - - - - - -	0·9	1·4	1·3
Degree of humidity - - - - - - -	77	67	69

The water present in the rooms exceeded that out of doors by 0°·2 grain in room 25 and 0°·1 grain in room 28, giving about the proper degree of humidity in both rooms, at their respective temperatures.

GROUP 2.

Subjects of Investigation.	External Air.	Room 25.	Room 26.	Room 27.	Room 28.
	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*
Temperature of evaporation - - - -	44·4	51·7	51·1	51·9	50·8
Difference of air temperature and evaporation temperature - - - - - - -	3·0	5·9	5·5	5·4	5·6
Temperature of dew-point - - - -	41·8	46·2	46·0	47·0	44·9
Difference of air and dew-point temperature -	6·1	11·4	10·6	10·3	11·5
Elastic force of vapour - - - -	0·226 in.	0·312 in.	0·311 in.	0·323 in.	0·296 in.
Weight in grains of water in a cubic foot of air	3·0	3·5	3·5	3·6	3·3
Grains short of saturation - - - -	0·8	1·8	1·6	1·7	1·9
Degree of humidity - - - - -	80	66	68	69	63

The water present in a cubic foot of air exceeded that in the same mass of external air by half a grain in rooms 25, 26, and 27, and by one-third of a grain in room 28.

Each cubic foot of air was 1¾ grain short of saturation in rooms 25, 26 and 27, and nearly two grains in room 28. The degree of humidity was 63 in room 28, in which the air was dry; 66 in room 25, 68 in room 26, and 69 in room 27, being all within the proper limits.

GROUP

GROUP 3.

Subjects of Investigation.	External Air.	Room 25.	Room 26.	Room 27.	Room 28.	Room 32.
	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
Temperature of evaporation - -	42·5	49·2	49·0	49·9	48·8	50·5
Difference of air and evaporation temperature - - - - -	3·6	6·3	4·8	3·9	6·0	6·7
Temperature of dew-point - -	38·4	43·2	44·4	46·1	43·3	44·2
Difference of air and dew-point temperature - - - - - -	7·7	12·3	9·4	7·7	11·5	13·0
Elastic force of vapour - - -	0·284	0·278	0·293	0·315	0·281	0·292
Weight in grains of water in a cubic foot of air - - - - - -	2·7	3·2	3·3	3·5	3·2	3·3
Grains short of saturation - -	0·9	1·8	1·4	1·1	1·7	1·9
Degree of humidity - - -	75	64	71	75	66	62

The water present out of doors in a cubic foot of air was 2·7 grains; there was half a grain additional in rooms 25, 26, 28 and 32, and ¾ of a grain in room 27.

The air in rooms 25, 28 and 32 was 1¾ grain, in room 26 was 1·4 grain, and in room 27 was 1·1 grain short of saturation.

The degree of humidity averaged 64 in rooms 25, 28 and 32, and averaged 73 in rooms 26 and 27, which were rather too humid.

From these three groups of experiments we deduce the following results:—

That the floor of every room was cold; even that portion opposite to the fire at the distance of four feet, which was from 6° to 8° only above the air at the centre of the room, and at all other parts was at much too low a temperature, health requiring that the floor should be warm, relative to the temperature of the room; so long as the feet are warm, cool air being neither unpleasant nor unhealthy. The walls of the rooms were all much too cold.

The air of the room was heated during the continuance of the fire from 7° to 8° only above the external temperature, excepting in room 32, in which the excess amounted to 10°.

The temperature of the ceiling exceeded that at the centre of the room, over points on the floor 4 feet and 10 feet from the fire, by 3° and 2° respectively.

From these results it is shown that the rooms were insufficiently warmed; that the temperature in them was very unequal, and consequently that currents of air were established of a conflicting nature; all the essentials of a comfortable room, it is evident, were wanting.

The consumption of coals was from 30 lbs. to 40 lbs. daily in each fire-place; the little heating effect of the fire upon the floor and walls of the rooms, with this comparatively large consumption of coal, is attributable in part to the want of furniture, or of receiving surfaces between the fire and the walls. The effect of radiant heat varies inversely as the square of the distance, so that the walls of the rooms, which were scarcely at all heated from the direct rays of the fire, could reflect no heat to the occupants of the apartments, but, on the contrary, would take heat from them.

In rooms thus circumstanced persons sitting near the fire will be warm on one side and cold on the other, and those far away too cold generally.

In the new portion of the Wellington Barracks, the draughts created by the air rushing through the perforations in the lower parts of the rooms, or through the crevices of the doors and windows, were found to play round and cool the backs of those seated near the fire, and to have the yet more serious effect of causing the whole floor to be as a cold bath, in which the feet necessarily would be constantly immersed; that this cold bath extended close up to the fire was shown by a thermometer, which, when placed on the floor, and above it by one foot, read only from 6° to 8° above the air of the rooms.

COMPARISON of the Results from the Four different Stoves used in the Experiments.

Wellington Barracks.—Groups 2 and 3.

On the floor at 4, 10, 13 and 20 feet from the fire, the temperature differed from that at the centre of the room, as follows:—

	Deg.	*Deg.*	*Deg.*	*Deg.*	
Bayley's Arnott's stove	5·5 above,	0·9 below,	3·8 below,	and 3·3 below	respectively.
The Ordnance stove	6·0 above,	0·6 below,	1·7 below,	and 2·0 below	"
Lee Stevens' stove -	7·0 above,	1.2 above,	1·8 below,	and 1·2 below	"
Edwards' Arnott's stove	8·0 above,	1·9 above,	0·2 below,	and 0·6 below	"
Jeake's Arnott's stove -	-	1·2 above,	1·4 below,	and 1·2 below	"

Therefore the temperature of the floor in the room heated by Edwards' Arnott's stove was warmer at all parts than in any other room; the next in order is that heated by Lee Stevens' stove.

On the walls opposite to the fire, on the same side as the fire, adjacent to buildings, and adjacent to passage—

	Deg.	*Deg.*	*Deg.*	*Deg.*	
By Bayley's Arnott's stove	2·6 below,	3·1 below,	2·8 below,	and 3·6 below	respectively.
Ordnance stove - -	2·3 below	- -	1·2 below,	and 2·5 below	"
Lee Stevens' stove -	1·7 below,	1·1 below,	1·1 below,	and 2·2 below	"
Edwards' Arnott's stove	1·0 below,	0·3 above,	1·3 below,	and 1·8 below	"

Therefore the temperature of the walls in the room heated by Edwards' Arnott's stove was warmer than in the other rooms, excepting on that adjacent to other buildings, which was somewhat warmer in the rooms heated by the Ordnance and Lee Stevens' stoves.

On the ceiling over a point on the floor, at the distances of 4 and 10 feet from the fire, the temperature was—

	Deg.	*Deg.*	
Bayley's Arnott's stove,	2·7 above,	and 0·9 above,	the centre of the room.
The Ordnance stove -	- -	and 3·6 above	"
Lee Stevens' stove -	- -	and 1·5 above	"
Edwards' Arnott's stove,	3·5 above,	and 1·3 above	"

Therefore the ceiling was cooler in the room heated by Bayley's Arnott's stove; the next in order was that heated by Edwards' Arnott's stove.

The general body of the air in the rooms heated by—

	Deg.	
Bayley's Arnott's stove,	was 54·9	The external temperature was 47°.
Ordnance stove -	was 54·3	
Lee Stevens' stove -	was 54·6	
Edwards' Arnott's stove	was 55·4	

The general body of air in the room, therefore, was maintained at the highest temperature by Edwards' Arnott's stove; at the next highest temperature by Lee Stevens' stove (for the excess of 0°·3 in Bayley's Arnott's stove was probably caused by the continuous presence of the observer night and day), and at the lowest by the Ordnance stove.

The room heated by Edwards' Arnott's stove was the only one furnished with a supply air channel led under the floor from the external air to a place in the room situated near to the fire, for the supply of the greater part of the oxygen required by the fire; whilst in the other rooms, the supply was wholly dependent on the air passing through key-holes, under the door, and through crevices, or wherever else it could be obtained, which, passing along the floor, thus lowered its temperature and disturbed the atmosphere of the lower part of the room.

The area of the air-channel furnished to room 28, was, however, somewhat too small, its area being less than that of the chimney-throat; some demand therefore was made upon the air of the room, for the purpose of combustion, but this was small in amount compared with the demand made upon the other rooms.

The fire-brick with which both Bayley's and Edwards' stoves were set radiated heat into the rooms throughout the night, and by causing their chimney-shafts to continue warm, prevented the usual descent of currents of cold air during the night.

Both the Ordnance and Lee Stevens' stove were cold in a short time after the fire was extinguished, so that the chimney-shafts becoming cold, permitted the objectionable descent of currents of air.

Neither Bailey's nor Edwards' stoves smoked or gave any trouble, either in lighting or attending to them; both the Ordnance and Lee Stevens' stoves smoked in the morning, probably owing to the coldness of their respective chimney-shafts, and continued to smoke for some time, as, in consequence of the large amount of air escaping from the room up the chimney, a long period elapsed before it became warm.

Bayley's Arnott's stove was furnished with too small a coal-box, which necessitated its being replenished during the day; the box was furnished with a door-way, for the purpose of its being re-supplied. The stove had no ash-pit; and the ash which either fell through the bottom, or escaped beside, was removed through a small door at least daily.
The blower was detached, and was thus liable to be mislaid or broken.

Edwards' Arnott's stove had a coal-box sufficiently large, not to need replenishing during a day of 12 hours, and had no door. It was furnished with an ash-pit capable of receiving the ashes for a period of three or more days, and the blower formed a part of the stove itself.

It was remarked by the attendant, Corporal Hart, that in Bailey's stove there would be great probability of barrack damages ensuing upon its use, from the likelihood of the door for the replenishing of the coal-box and the other for removing the ash being broken; and also because the blower was detached. He considered that Edwards' Arnott's stove gave less trouble, was less liable to be broken, and was therefore preferable. He also said that both Bayley's and Edwards' stove gave a pleasant fire in a very short time after lighting, were very little trouble in lighting, and needed but trifling attendance afterwards.

With respect to Lee Stevens' stove he said, that it was troublesome, required constant attendance, and that half the day sometimes passed before the fire was properly kindled, and that it frequently smoked.

EXPERIMENTS relating to the Ventilation of the Wellington Barracks.

Experiments were made for the determination of the draughts of each chimney, from observations of its temperature, and also by means of an anemometer placed within the chimney. The former of these methods, chiefly on account of the ever-varying temperature, may be considered imperfect for determining with accuracy the amount of ventilation by the chimney. In the calculations based upon the observed temperatures, no allowance was made for the friction of the air in its ascent up the chimney, yet the results found gave a less degree of upward draught than those which were recorded by the anemometer. The results of this last instrument were, however, scarcely more satisfactory, and the determinations from both methods must be looked upon as indications only.

The most probable results from these experiments show that, in room 25, with a good fire, from 600 to 900 cubic feet of air per minute was escaping from the chimney; and in room 28, with a bad fire, from 500 to 600 feet; it seems probable that, under precisely the same circumstances, rooms 25, 28, and 32 would have shown similar results.

In rooms 26 and 27 the rate of air escaping up the chimney was fully 1,000 cubic feet per minute; this rate of escape, dependent upon the action of the fire, would decrease as the fire declined, and ultimately cease on the fire becoming extinguished. The upward current, during its continuance, would take with it warm air from the room, and on its cessation permit cold external air from out of doors to pour down and absorb the heat from the furniture and walls of the apartment, which before morning would be thus very considerably cooled.

From these determinations it would seem that during the day a large portion of the air from rooms 26 and 27 must have passed up the chimneys, and with it have removed many of the impurities formed by respiration. In rooms 25 and 28 but little air passed away by the chimneys; its escape, therefore, must have been sought through windows, doors and accidental sources of ventilation.

The wide open chimneys in rooms 26 and 27, sucking up not only the smoke and heated air, but withdrawing also the pure air from the lower part of the room, rendered it of lower temperature than in rooms 25 and 28, in which the chimney throats were small, and received, for the most part, the heated air and smoke only; it is therefore evident that the rules for calculating the draught of a chimney, based upon it being a force equal to the difference of weight of the heated and cold columns of air, fails as applied to chimneys with such large throats. The results by this method were less than half of those found by the anemometer, which it is probable were more nearly approximate.

The throat of the chimney of room 25 was 36 square inches in area, and was the smallest of all; the temperature of the air at the chimney-pot was 75°, and was the lowest of all; therefore, the heat generated by the stove in this apartment was more effectually applied to warm the room than by any other.

The escape of air at night from rooms 25 and 28 being prevented by the chimneys having narrow throats, for closing them either entirely or partially as required, together with the heat radiated from the fire-brick with which both stoves were fitted, caused the warmth of the room to be retained at night; while the chimneys of rooms 26 and 27 becoming cold, would for a little time continue to withdraw the air from the apartment, then cease their action, and finally create a descending current, depending upon the relative temperature of the room and external air.

Mr. *Roscoe's* Chemical Experiments in relation to Ventilation, refers to Section H.

Experiments were made at the request of the Commission by Henry Roscoe, Esq., B.A., under the direction of Dr. Lyon Playfair, to determine the amount of ventilation by chemical examination of the air.

For his report, *see* Appendix.

Mr. Roscoe's first experiment was the releasing a certain amount of carbonic acid into a room without a fire, the flue and all the doors and windows being closed; he found that the amount lessened in half an hour from 0·7 to 0·3 per cent. of the total volume, which caused him to infer that the escape of carbonic acid was great through closed windows, door, and walls.

In a soldiers' room, where 16 men sleep in a cubical space of 7,920 feet, he found that there was $1\frac{1}{4}$ volume of carbonic acid in 1,000 of air; in the same room, with 20 men sleeping, he found $1\frac{2}{3}$ volume of carbonic acid in 1,000 of air.

From these experiments he found that $13\frac{1}{4}$ cubic feet per minute of air passing in and out of the room, was insufficient even in cold weather to remove animal effluvia from the rooms, and that in warm weather it would become less efficient.

In a large school-room he found $2\frac{2}{3}$ nearly of carbonic acid in 1,000 volumes of air.

In a small school-room $3\frac{1}{10}$ volume of carbonic acid in 1,000 volumes.

In the gallery of a crowded theatre, he determined the carbonic acid to be 3·2; and in the pit 2·6 volumes out of 1,000 of air.

He also determined its amount at different levels, and found that carbonic acid was equally diffused throughout the air of the apartment, from the level of 2½ feet from the floor, to within 6 inches of the ceiling.

Independent of these physical and chemical methods for determining the amount of ventilation, the sense of smell afforded a rough approximation to the purity of the air; the annoyance thus experienced on entering a room badly ventilated, may vary with different individuals, but furnishes a very ready means of roughly judging whether a room be pure or not.

Many rooms at the Wellington Barracks were entered by the members of the Commission; in every one a close, offensive smell was experienced, and the ventilation was evidently bad.

In the ceiling of every room, two or three small gratings were inserted, connected with other gratings of a similar size and form in the face of the external walls of the buildings. At no examination of these was it found that air was escaping from them; on the contrary, flame was bent inwards, and fumes of partially consumed substances were driven into the room.

From Mr. Roscoe's experiments it would seem that impure gases did not collect in excess, and by the known diffusion of gases, and by the general commingling of aqueous vapour, nitrogen, carbonic acid, &c., in the changing atmosphere of an inhabited room, they prove that all noxious gases would pass from a room if proper exits were provided for such purposes.

From all the experiments it is evident that the general supply of fresh air and the means of removing impure air were alike insufficient, and consequently that an artificial egress for bad air, and an artificial ingress for fresh air were absolutely necessary.

RESULTS OF THE EXPERIMENTS AT THE WELLINGTON BARRACKS, AND RECOMMENDATIONS.

From the whole of the results obtained at the Wellington Barracks, it is evident that the warming and ventilation of the several barrack-rooms were alike insufficiently performed.

The great defect, so far as temperature is concerned, was the coldness of the floor and walls of the rooms. It is not necessary, and is not desirable to heat barrack-rooms to that temperature which is required where sedentary occupations are carried on; but at what temperature soever it is necessary to keep the room, it should be such as to ensure the health of the men, which cannot be maintained if their feet are habitually cold; and this will be the case when the flooring is at a lower temperature than the air of the room.

The floor of that room was the warmest in which an air-channel was led from the external air to supply the fire with oxygen, and the temperature of that room was the most equable. An air-channel to every room, to admit air, first leading it behind the stove, so that it shall be warmed before it enters the room, is strongly to be recommended. This would go far towards keeping the floor and walls warm.

Whilst the Commissioners were engaged at the Wellington Barracks, they, with Lieut. Du Cane, R.E., inspected the buildings then being erected, and it was explained to them, that the air was allowed to enter under the floor throughout its whole extent, and to pass from thence into the room, through perforations in the wainscoting next the floor, extending throughout the width of the room. A more effectual mode could scarcely be suggested to extract the heat from the floor, in its under passage, and to cause draughts and cold feet on entering the room. The Commissioners strongly recommend the discontinuance of this plan, and of all others which tend to lower the temperature of the floor, on the grounds of economy, health, and comfort.

The stove to be recommended for a barrack-room, should be simple in its construction, solid in its workmanship, not easily broken or put out of order, should require but little attendance, be economical in its consumption of fuel, effective in warming, and prevent the formation of smoke.

These conditions were best approached by the different stoves of Arnott's construction; and of these, the stoves by Messrs. Edwards and Jeakes were the best, but neither of them was strong enough for the ordinary use of a barrack-room.

It

It is desirable that all fire-places should have fire-brick linings, and that the throat of each chimney should be contracted, and that there should be a power of nearly, though not entirely, closing it.

Arrangements should be made for carrying impure air away from the room; the want of such arrangements will become more urgent by performing the requisite contraction of the chimney throat. By creating a rarefied atmosphere in a metal pipe, inserted in the ceiling and leading into the chimney, in which a gas jet should be kept burning both night and day, in summer and in winter, an upshaft draught would be created, which would act as a most effectual means of ventilation.

The continuous removal of impure air as it arises is of very much greater importance than the cubical contents of air in a room.

In the soldiers' rooms which are constantly occupied, the amount of cubical space can be of very little importance, for how lofty soever the rooms may be, unless the heated and impure air can pass away, the space will soon be occupied by air unfit for respiration, and the greater or less size of the room will only resolve itself into a little more or a little less time before the air is brought into an impure condition.

The soldiers' rooms are about 12 feet in height; with good ventilation this might be reduced to 11 feet, or even to 10 feet, without disadvantage.

It is very desirable to have a power of ascertaining, by some simple means, when an inhabited room is or is not unhealthy. It is not easy to determine the amount of carbonic acid present in the air; but from the experiments at the Wellington Barracks, and elsewhere, it appears to be so equably diffused, that with good ventilation it cannot collect in injurious quantities; we may consider, that if the air of a room be offensive on entering, and a thermometer placed near the ceiling read higher than the general temperature of the apartment, that the ventilation is insufficient, and the room unhealthy; on the other hand, if it be inoffensive on entering, the ceiling cool, and smoke not accumulating from persons smoking in the room, it may be inferred that the ventilation is sufficient, and that the room is healthy.

General Results from all the Experiments, and General Recommendations.

From the experiments made both at the Board of Health and at the Wellington Barracks, it is evident that smoke from almost all fires for warming rooms may be prevented.

The way coal is burned generally is very far from perfect, and the consequence is, that instead of coal being made to burn with flame, and become converted into transparent invisible vapour and gases, it is only partially consumed, by which large quantities of carbon in the shape of soot and smoke are sent up the chimney shafts to thicken and contaminate the air we breathe, and to descend in the form of blacks, to sully the purity of all surrounding objects.

As we have before stated, the lungs take, without discrimination, all that is presented to them; thus we inhale a tainted air, which clogs the organs of respiration; smoke also covers every article of furniture with dirt.

Smoke, in large towns, arrests a portion of the sun's rays, and shortens the duration of metropolitan daylight.

The smoke of London is not only a nuisance, but is a very expensive one, and implies a great waste of fuel.

All these evils, and others not mentioned, may be obviated by means already known, and with a great saving of expense.

The most effectual remedy would be the use of fire-places constructed to prevent the formation of smoke. So far as we can trace by aid of the patented inventions, the methods open to us for doing so may be classified as follows—

Mechanical methods of supplying fuel, on the plan of Cutler, in 1815, and subsequently improved upon by Arnott; by the feeding shovel applied between the bars of the grate, as in 1816; by pushing the coal under in detached charges, as with the action of an air-pump, in 1854; by supplying it at the back of the fire, as in 1825; by placing it round about the grate and leaving it to coke before using, as in 1856; by bringing the grate down to the fuel, as in Jeakes' in 1854; and by one grate above another, also in 1854; by circular grates to be inverted after each supply, according to the idea originally suggested by Franklin.

By currents of air, downwards upon the fire, to direct the smoke through the back of the grate, according to Williamson in 1855, and Marsh in 1856. Deflected when heated over the fire, as in Stevens' in 1853; directed in front of and through, as in Leslie's, tried by the Commission, and by an air-distributor in the heart of the fire, as in an old invention of 1795; by hot air chambers formed by inclined register-plates above the fire, according to Newton in 1849, and Henry Olding in 1854.

The first of these principles effects the entire consumption of smoke, or to speak more correctly, prevents any from being formed, by promoting a more uniform and perfect combustion of fuel; of the different constructions probably any one among them is good. Cutler's grate on the principle adopted by Arnott, is the best adapted for general application, and has since been used as the base of many different modifications; it has also the merit of involving no great expense in its actual construction, and is purchaseable at a very moderate cost; at the same time the plan may form the base of any of the ornamental and elegant designs of stove-grates now in use. So far as experiment tended to show, the altering of a common grate into an Arnott's entirely failed.

But, however good in principle, we are prepared to find great difficulty in replacing the grates now in use with others of a different and even improved construction, though we may reasonably hope that henceforth, in new dwelling-houses, and where replacements are necessary, that only the more improved forms will be adopted.

One of the great advantages of Cutler's and Arnott's plan consists in the even distribution of the fuel supplied from below, which is one great and important element of mechanical firing or coaling. By paying attention in this particular to the stoking of an ordinary fire, we can obviate to some extent the waste and inconvenience attendant upon the great masses of smoke which are evolved on throwing on a large quantity of coals, according to our present method, when a supply is needed.

The method of surrounding the grate with a coking-chamber is good in principle, as coal when applied after being some time subjected to a distillatory process (without becoming coked in the sense of the word), burns freely, and with but little smoke; this we may all have observed in the case of large coals applied on the top of the fire towards the back, where they have been permitted to smoulder, and which when broken into pieces and distributed over its surface ignite readily and emit but little smoke, while fresh coal of the same size and to the same amount would, as we all know, have thrown off a considerable quantity, plainly showing that if each charge of fuel before supplied could be subjected for a time to a similar distillatory process, it would emit, when distributed over the top of the fire, comparatively little smoke; but the Commission are only prepared to recommend the principle, and not any particular form of grate for carrying it into effect.

The feeding-shovel is an implement which might easily be adapted to the ordinary grate, and would simply require the lower bar to be rendered movable, for the purpose of thrusting in the fuel underneath the fire. The shovel in passing under would raise the bar, which would return to its position on the shovel being withdrawn. We believe the only difficulty in the way of this plan becoming generally available, is the reluctance with which new methods are substituted for old established practices.

The revolving grate is also good in principle, and achieves the consumption of smoke by the least troublesome of methods. The drawback to its use is the great departure it occasions from the ordinary form of grate, and the enclosure of the fire on all sides with open bars.

The best among the methods for the suppression of smoke by currents of air are not so easily discriminated; and no method that we have seen or are acquainted with, accomplishes perfect freedom from smoke. In Williamson's construction, the register is prepared to admit of an upward draught at times, to carry off the smoke on lighting, and probably on throwing on coals. Leslie's and Stevens' stoves both smoke, though not to the extent of ordinary grates.

Williamson's principle is sound, and so far as we may judge without actual examination, is likely to be the best in practice.

In order to effect an agreeable and pleasant ventilation, and prevent currents of cold air rushing from the doors and windows in the direction of the fire, it is to be recommended that the supply of atmospheric air for the support of combustion be provided from some independent source, such as an air channel or tube under the floor in communication with the external air. The ventilation of the room would then be carried on by proper apertures, independently of the supply of air to the fire.

The Commission therefore recommend:

> That the area of the supply-pipe or channel be larger than the area of the smallest part of the chimney-flue, in order that fresh air in excess of that required for combustion may be supplied into the room to the amount of 15 to 20 feet per minute for each occupant, by which arrangement the fresh air introduced for the purposes of ventilation may be warmed or tempered before entering the apartment.
>
> That the supply air-channel be provided with a closing apparatus.
>
> That for the ventilation of rooms, exits should be provided for the spent air near the ceiling, either by perforations in the cornice at different parts of the room; by apertures made near the ceiling, or by one sufficient aperture leading into the chimney, with a rarefier in case of need, to such extent as to remove from 15 to 20 cubic feet per minute for each occupant.

By thus pouring into the room a current of gently warmed air, and removing from it an equal amount of spent air, a much greater degree of ventilation could be borne without discomfort, than if the air supply were derived from accidental sources; all whistling of windows, pressure upon doors, and cold draughts would be greatly checked, if not quite prevented.

In regard to fire-grates in general, from the preceding experiments, and from the information which has been collected, the Commission is prepared to recommend:—

1. The use of reflecting surfaces to direct an increased amount of radiated heat into the room.

2. That the chimney-flue should be of small dimensions, and not more than 9 inches in diameter at the widest part, to diminish the quantity of air escaping up the chimney, and reduce its tendency to smoke.

3. That chimney-flues should not be situated in the outer walls of dwelling-houses, to become chilled by contact with the comparatively low temperature of the external air.

4. That the chimney-flue should be provided with a closing apparatus.

5. That the aperture for the escape of the smoke should be placed at the back of the fire, to increase the intensity of combustion and promote the radiation of heat.

6. That fire-brick linings to grates should be in general use.

7. That sunk ash-pits and concealed ash-pans be employed to prevent dust, &c. being diffused into the room.

8. That the fire should not be on a level with the floor; this is made evident by the experiments with Leslie's grate.

9. That as a rule, the fire-grate is best situated which may be seen from the greatest number of points in the room.

10. That a good frontage of fire surface should be exposed; this does not necessitate any corresponding increase in the depth of the grate from back to front.

11. That those stoves be used that prevent the formation of smoke; the formation of smoke being a proof of imperfect combustion, and a representation of so much fuel wasted.

12. The Commission strongly recommend that the fire-grate should be studied in its construction with the view to its effecting a better and more economical consumption of fuel, and a more equable distribution of heat, and not as a contrivance for the ventilation of rooms. The Commission is decidedly of opinion, that so long as the fire-grate is studied with a view to this twofold application, it will not succeed well in the performance of either.

From the list of inventions, we gather that fire-brick has occasionally of late years been employed in the lining and construction of some forms of fire-grate.

That the value of increasing the upward draught by decreasing the aperture of escape up the chimney-throat is acknowledged by the various constructions of registers for this purpose, and more recently by the contracted throat and employment of the valve.

That reflection from polished surfaces for utilising heat, which would otherwise escape, and by conduction from heated metal, has formed the base of several inventions, of which we may mention Sylvester's grate, and those of Marsh and Anderson in 1852; of which Sylvester's is the better known.

The distribution of warm air into the apartment through a part of the stove facings or elsewhere, from hot-air chambers round about the grate, or flues or conducting pipes having connexion with the external air on the plan of Professor Hosking, or as patented by Nicoll of Dundee in 1855.

Independently of the height above the floor, the position of the grate in regard to the fire-place and to the apartment has been varied, according to the diversity of opinions entertained on the subject. In some of the inventions detailed in the Appendix, the grate will be found to have been deeply recessed for the better concentration and diffusion of heat; in others, to project into the room to radiate its heat more freely, and to expose a greater frontage of fire surface. In conformity with our conclusion that the position of that grate is best, which is situated so as to be seen from the greatest number of points in the room, whenever it is possible, we would advocate the employment of those constructions which throw the grate forward, as in the case of Nicoll of Dundee in 1855, where the stove facings are flush with the line of the wall; but this arrangement is not consistent with small rooms, and would tend to produce a degree of discomfort and inconvenience for which the improved position of the grate would hardly compensate. Such projecting grates, whether in large rooms or otherwise, would necessarily require careful stoking, and the fuel to be well applied at the back, if not smoke preventing.

The question of convenience also enters into the application of open fire-grate stoves which, constructed on the principle of that of 1781, and set forward in an apartment, impart a considerable degree of radiant heat, and heat by contact with the casing, which if of moderate temperature would contribute to warm but not to deteriorate the surrounding air; but such stoves, for reasons of convenience, are not applicable to small or even ordinary sized rooms, and must be regarded of special rather than of general application. The same remarks, but in a less degree, apply to the elegant and projecting fire-grate of Mr. Jeffreys in 1838, which, as regards position, is calculated to afford a large extent of fire-surface to a spacious apartment. In addition to the increased degree of radiant heat such grates afford, we may not forget that the light from an open fire is as congenial to the health as to the spirits.

In the list of inventions frequent mention is made of minor appliances for cleanliness and convenience in the management of the common fire-grate; many of them well worthy of adoption, and easily to be applied.

We are satisfied that the very ingenious inventions that have been discussed (many of which are sound in principle), afford sufficient grounds for the ultimate construction of grates which shall answer the purposes of the Commission in leading to a better and more efficient system in the consumption of fuel. The Commission are therefore desirous to recommend the results of their observations and experiments, together with the abstract of inventions printed in the Appendix, to the notice of the public as well as the mechanician, that the principles which they have determined to be sound and applicable, may be combined in some form of fire-grate suited if possible to all descriptions of dwelling-houses; the prevention of smoke and economy of fuel should be brought within reach of every one, that the benefit of the inquiry may belong equally to that part of the community to whom such means of economy is of the highest value, and who by the number and small size of their dwelling-houses, contribute more largely than any other to the evil of the smoke nuisance, and are least of all able to afford the waste and sustain the inconvenience which such smoke implies.

It is difficult to apply a sound and effective system of ventilation to all descriptions of dwelling-houses, and it is especially so in old houses, where the flues and other constructions are unadapted for its introduction. Much might, however, be accomplished in the oldest and worst description of dwellings by separating the supply of air for the fire from that for ventilation.

In the future construction of new buildings, the necessary contrivances, flues, channels, &c. are easily introduced, and a greatly improved system of warming and ventilating may be at once adopted. For the attainment of these objects, the attention of the Commissioners has been directed towards a plan which appears to meet all the requirements of a more efficient system of heating and ventilation. Its success cannot be vouched for, but we consider it entitled to the attention of architects and builders, as an experiment worthy of trial.

The annexed section of a house will be sufficient to illustrate the principle on which it is proposed to construct dwelling-houses. It is comparatively easy in this case to secure an equable and agreeable temperature; but it is a matter of greater difficulty to effect the requisite interchange of the air without causing dangerous and uncomfortable draughts. The inconvenience of the present system of ventilation through the chimney is already apparent, and there can no longer be any doubt that it is most advisable to supply the fire with oxygen direct from the external atmosphere. But on the other hand, the ventilation of rooms by the fire and chimney seems, in many respects, to present advantages which cannot very readily be compensated for by any more complicated plan. In the proposed system it is attempted, by keeping the air of the room and that passing through the fire separate, to secure the advantages and obviate the defects of chimney ventilation.

For example, let us take a new building, and assume that we have our own way in the formation of the flues and the other adjuncts of warming and ventilating. Suppose that in such a house there are eight rooms, as shown in sectional elevation, figure 1, with the fire-places placed back to back against the partition wall. It is proposed in this case to conduct all the products of combustion into a single vertical flue, *b*, *b*, *b*, whilst to supply the fire, air ducts or channels, *f*, *f*, *f*, *f*, &c. leading from the external atmosphere, should be introduced beneath the flooring in each room, and opening to the fire through the hearth-stone. The chimney or single flue would probably not require to be more than 10 inches in diameter, and might be made of clay pipes, vitrified or glazed inside.

Immediately above the fire-place in each room, the smoke flue, *b*, *b*, *b*, would have a descending branch flue to fit into the throat above the fire-grate, and this part would be constructed so as to be air-tight in relation to the surrounding air chamber. On this plan it will be observed that the products of combustion

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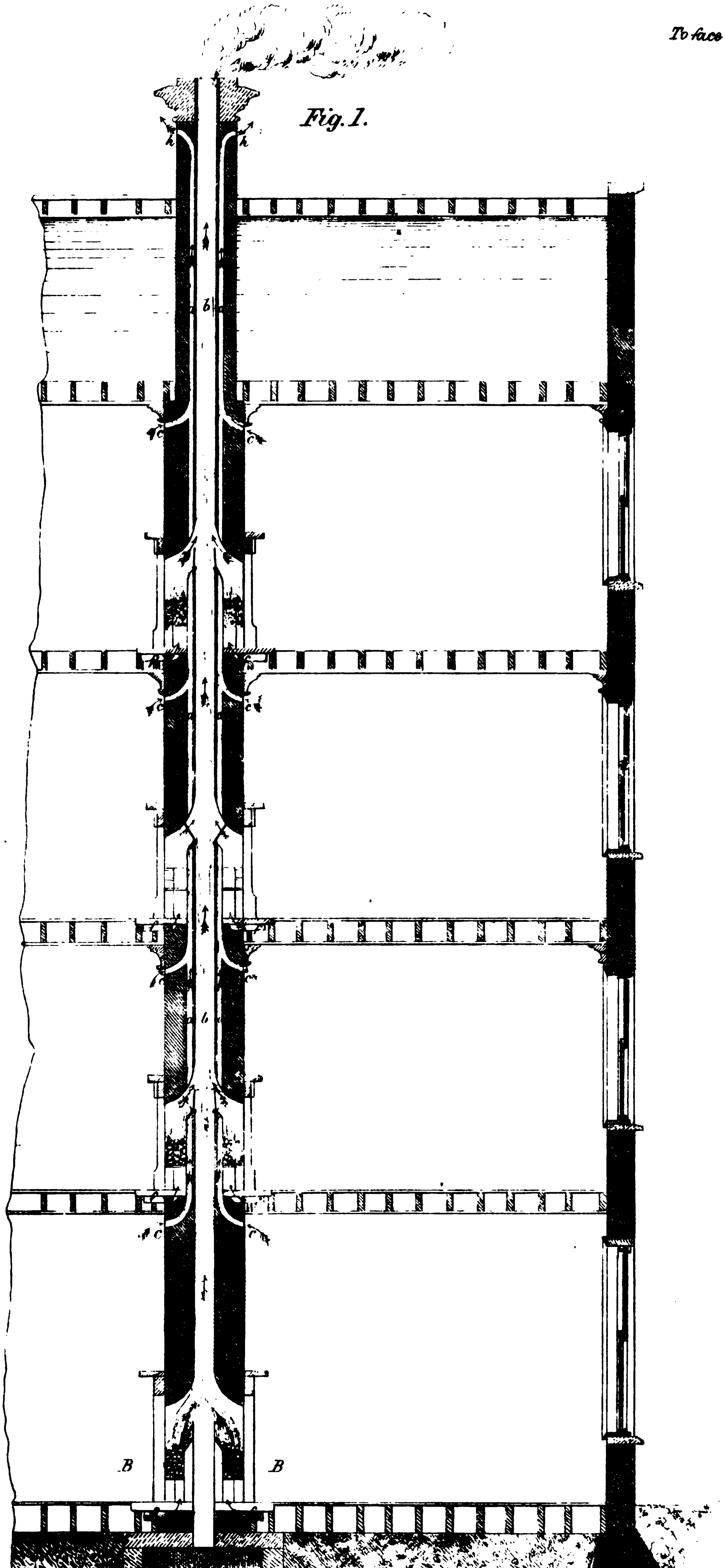
Fig. 1.



J. Basire lith.

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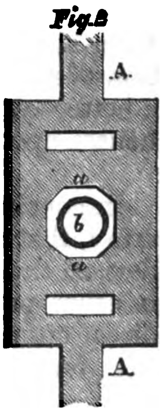
Henry Hansard Printer.

combustion from all the fires of the house are collected into one flue, with the kitchen fire at bottom, so as to ensure more or less heat passing up the chimney at all times of the year.

Fig. 2



Around the smoke flue, *b*, it is proposed to leave an open annular space, *a*, *a*, passing up the whole length of the chimney, from the top of the kitchen flue to the full height of the shaft at *h*, *h*, *Fig*. 1. This might be left of an octagonal form, as shown in plan, *Fig*. 2. This chamber would become the means of relieving the rooms of the vitiated air, the heated smoke flue causing a constant current to rise through it, carrying along with it the injurious products of each room, by the apertures *c*, *c*, *c*, *c*, and passing off above by the apertures *h*, *h*, beneath the chimney top.

Thus, the fire being supplied with air by a sufficiently capacious air duct, the constant loss of heat and draughts from windows and doors are obviated, while at the same time the air of the room is kept pure by the passing away, at all times during the day and evening, of those portions least fitted for respiration, and without the possibility of the passage of smoke through the apertures intended for ventilation.

In the event of one smoke flue being liable to counter draughts descending from fires on one side to those on the other, two smoke flues might be fixed in the air chamber, as at *k*, *k*, *Fig*. 3; or the single flue might be divided by a diaphragm or partition, as at *n*, *n*, *Fig*. 4; either of which plans would effectually prevent ascending currents from one room descending into that of another room.

On examination, it will be found that this system would not only lessen the quantity of smoke evolved from fires, but would retain the air in the space surrounding the smoke flue at all times in a rarefied state, ensuring a constant current of fresh air passing through the different rooms, and this irrespective of the lighting of any but the kitchen fires.

Fig. 3

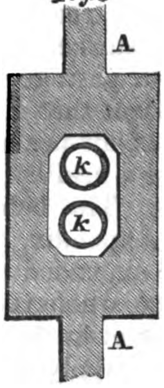
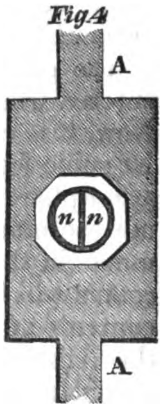


Fig. 4



Another advantage of this construction would be, the facility afforded by a perfectly straight and vertical flue for brushing and cleansing; and by extending the tube or tubes downwards, a dust hole, *g*, may be formed under the kitchen fires, whence the soot could be removed as it accumulated at convenient intervals. In addition to these suggestions, we would advise that a perfectly close and tight damper be fixed in the throat of each fire-place, communicating with the vertical smoke flue, in order effectually to close or shut off any particular room from the smoke flue during the summer months, when fires are not required.

We also recommend that double panes of glass be used in small rooms, and double sashes in large rooms; in which case there should be a stratum of air allowed, from five to six inches, between the two sashes.

The cost of double panes in the same sash, as patented by Mr. Bridges Adams, is about 3 *l*. 15 *s*. for 40 square feet. It may be less when the nature of the work is better understood. The cost of a second sash and glazing, of like dimensions, would be about double, or 7 *l*. 10 *s*. This cost would, however, soon be recompensed by a saving of fuel; and in rooms where the glazing surface is large it is more essential than in smaller rooms. The want of it in the board-room of the Board of Health has rendered the room exceptional, and causes all the experiments made in that room to be of less value than they otherwise would have been, as they do not truly represent the distribution of temperature as it exists in our own ordinary dwelling-rooms.

Another advantage attendant upon the use of double windows is the diminishing the effect of out-door sounds within the room, and more particularly in towns, where the street noises are prevalent.

By the use of gas, or coke, there is no smoke; but, with respect to the former, the results of all our inquiries prove it too expensive for heating purposes in cities or towns remote from the coal districts.

It will be a question, if not at present, at no very distant future, whether there should not be some legislative enactment to enforce the practical operation of results similar to those arrived at, in regard to ventilation, and effecting a better system in the consumption of fuel, and in the erection of new dwelling-houses upon a better and greatly improved system of construction.

In conclusion, we have to observe, in regard to the sanitary condition of the army, that a more defective system of warming and ventilation could not be devised than that exhibited at the Wellington Barracks, and assuming that those in other parts of the kingdom are not superior, if as good, we would beg to direct attention to the evils and defects which exist, not only in the construction, but the management of these important establishments.

As the question of health is one of the very first importance, we have paid particular attention to the present defective state of barrack accommodation. The space allowed for 16 men in the Wellington Barracks, is bounded by 33 feet long, 20 feet wide, and 12 feet in height; this gives an area of floor surface = 660 square feet, and contains in cubic contents 7,920 cubic feet; each man will therefore have 41·6 square feet of floor, and about 500 cubic feet of space. In each room there are three windows, and the area of the glazed surface is 70 square feet, and the rooms, four in number, are entered from a passage nine feet wide communicating with the outward air. Now, it is evident that a man requires, according to the best authorities, at least 10 cubic feet of air per minute, but in close rooms, and in order to retain the atmosphere in a healthy state for respiration, it is found that 20 cubic feet is not too much. This being the case, it will be seen, on referring to the experiments in the Appendix, that the quantity of air contained in one of the barrack rooms will be expended by 16 men in 25 minutes, or it will require the cubical contents of the whole room replenished in that time. Viewing the subject in this light, we find in the construction of those rooms that there are no means provided for a supply of air at all equivalent to the consumption that is continually going on during the hours of rest, or when the whole number of men happen to be present in the room for any length of time. Under these circumstances, instead of having a supply of 20 cubic feet of fresh air per man, they cannot by possibility, when the door is shut, have one-fourth of that supply. Living and breathing in such an atmosphere, impregnated with all the impurities of putrescent bodies or effluvia proceeding from the lungs of so many persons in a small space, is quite sufficient to account for the unhealthy state of the army and the consequent injuries which an atmosphere of this kind must eventually, and at no very distant period, entail upon the health of those who are subjected to it. There is no constitution, however vigorous, but what must ultimately be undermined by such a process; the poison is in the atmosphere they breathe, and it is not to be wondered at that disease and death are the result.

What adds greatly to the discomfort of the men in barracks, and what tends to increase the nuisance and vitiate the atmosphere of the barrack room is, the abominable practice of having an open wooden vessel or tub standing in each room as an urinal. Why cannot that nuisance be removed, and what difficulty can possibly exist in forming in the corner of each room, a basin and flow pipes, concealed and well ventilated, to carry off these pestilential odours? It may be partitioned off by a small air-tight door, from the room, and a small stream of water with proper attention would always keep it sweet and clean. This remedy is applicable to barracks of every kind and description, and may be accomplished at a mere trifle of expense. Should it however be considered, according to a mistaken economy, unnecessary, certainly it would not be too much to remove the wooden vessel, and substitute one of a very different material.

Let us compare the space occupied by the soldiers in barrack with that appropriated to individuals residing in towns such as Manchester, where a large proportion

portion of the population are engaged in manufactures, and occupy the smaller description of tenements. In that city and the surrounding towns the houses containing a family of five persons, a man, his wife, and three children, generally occupy a sitting-room, bed-room, and a small closet or pantry behind. In the improved cottages there is generally a small yard and outhouse attached, but taking the older description of residences, it will be found that the sitting-room below, and bed-room above, contain a floor area of 78 square feet, and the cubic contents of both rooms about 3,900 feet. This gives to each of the inmates 78 square feet of flooring, and 780 cubic feet of space, or as 80 to 45 in favour of the residents of small tenements compared to the allotments of full grown men in barracks. It is true that some houses are smaller than those referred to above are in existence, namely 12 × 12 wide and eight feet high, but in these it seldom occurs that there are more than two or three inmates. The general dimensions of the cottage house are 15 feet long, 14 feet wide, and 9 feet high, exclusive of the small yard and pantry outside. In some of the narrow streets now closed in by surrounding buildings, the old tenements of contracted dimensions, such as those mentioned above, are still in existence, and in them is the receptacle of fever, disease and death.

In the agricultural districts the comparison is still more in favour of the labourer, and against the soldier; and, looking at these circumstances alone, independent of other considerations, it is not surprising that the mortality in the army should be so much in excess of that of the inhabitants of agricultural districts and of towns.

According to the municipal, building, and sanitary regulations of Manchester, the authorities insist that any dwelling-house to be built within the borough shall be provided with a privy and ash-pit, and shall be constructed in a yard attached to the premises, but not in front of the house; and over such privy or ash-pit no bed-room or sleeping-room shall be built, &c.; these regulations are strictly enforced. Those of the better class of workmen inhabit houses having a kitchen and parlour below, and two large sleeping rooms above; and that exclusive of the yard, pantry and convenience out of doors. The other (less numerous), and adapted for an inferior class of workmen, comprises two small rooms below, a sitting-room, and a pantry for washing, and one large or two small sleeping-rooms above.

Looking at either of these classes of houses, with all the conveniences attached, it is evident that even the more contracted is greatly superior to the accommodation afforded to the soldier; and why should this be? Because the same attention has not been paid to the lodging of the army, either in or out of barracks, as has from recent sanitary regulations been paid to the housing of the working community. It may be said that Manchester, which we have selected for comparison, does not stand high in the estimation of the public for its sanitary condition, and that the mortality is greater than in most other towns. This is true, if taken from the returns founded upon the rate of mortality in children under five years of age, and that arising from the nature of the employment of mothers in the manufactures, where the children are neglected and left to the care of strangers, and improper treatment during the tender age of infancy. It is, however, widely different as regards the adult population, and in this respect the mortality will bear a comparison with that of any other manufacturing town in the kingdom.

Under all the circumstances, we would urgently direct the attention of the Minister of War and the Horse Guards to the *absolute necessity* of providing more room and accommodation for the soldier in barracks; and that, instead of 500 cubic feet of space, that 700 to 800 cubic feet should be allowed per man, or, as in the case of the Wellington Barracks, that only 10 persons should occupy the space allotted to 16; and that these regulations should be enforced as soon as extra spaces can be provided throughout the whole of the United Kingdom.

Also, that a more economical and healthy system of heating and ventilating be introduced, and that other conveniences, such as the improved fire-grates and better formation of the chimney flues be introduced into every room in every barrack of the Kingdom.

Should these suggestions be adopted, and the remedies properly applied, the time will soon arrive when the sanitary returns of the British army will bear a comparison and prove equally satisfactory to that of any other part of the community.

Wm. Fairbairn, F.R.S.
James Glaisher, F.R.S.
Charles Wheatstone, F.R.S.

My dear Sir, Edinburgh University, 2 February 1859.

I HAVE read the report of the Commission on Ventilation, but I am unable to sign it as a Commissioner for the following reasons:

1. My appointment as Professor of Chemistry to this University, and the preparation necessary for it, combined with my occupation in London, left me little time to attend to the work of the Commission.

2. I have great objection to sign the Report in a merely formal manner, and thus receive credit for work which I was unable to perform.

Under these circumstances I beg you to withdraw my name from the Commission, in the labours of which I should have taken a special and active interest, had not my excessive engagements at the time of its sitting rendered it impossible for me to do so.

Yours, &c.,
Lyon Playfair.

J. F. Campbell, Esq.,
Secretary to the Ventilation Committee.

APPENDIX.

APPENDIX.

Appendix.

ABSTRACTS OF PATENTED INVENTIONS.

SECTION I.

FOR THE PREVENTION OF SMOKE BY FEEDING FROM BELOW UPWARDS, AND ROTARY OR INVERTING GRATES.

JOHN CUTLER, Great Queen-street, Lincoln's Inn-fields (Iron Founder). 1815. No. 3,873.

Improvements in Fireplaces, Stoves, &c.

Is similar in appearance to a register stove, but is supplied with fuel from below. The fire-grate is open, and underneath is a metal chamber or receptacle filled with coal or other fuel. The fire is lighted above, and as the fuel burns away the bottom of the coal-box is raised by a mechanical arrangement of chains and pulleys, and fresh coal thus introduced into the lower part of the fire. There are two horizontal apertures at the back of the stove, the one for the supply of the draught necessary to support combustion, the other situated above, and narrow, in connexion with the flue, for the egress of dust, &c. The fire does not rest upon bars, in the ordinary way, but is open to the fuel-box underneath, and is lighted from the top.

THOMAS DEAKIN, Ludgate-hill, London (Ironmonger). 1816. No. 3,975.

A New and Improved Stove-grate or Fireplace.

A metal reservoir or box is affixed to the back part of the stove capable of containing coal for one day's consumption. The lower part of the grate at the back has free communication with the coal-box; as fuel is required it is drawn forward into the grate by means of a screw in front of the fireplace. The coals being supplied horizontally, the smoke from the fire is designed to be nearly all consumed. Above and immediately over the opening into the coal-box is a vertical register, by which to regulate the draught.

JOHN ISAAC HAWKINS, Great Titchfield-street, Middlesex (Engineer). 1816. No. 4,001.

Apparatus for supplying Grates and Stoves with Fuel.

By supplying coal to the fire underneath, by means of a feeding shovel, which in shape resembles an ordinary shovel, but is covered in with sides and top to form a sort of box or pan, open only at the side or end which is opposite to the handle, the plane of the opening making an angle of 45° with the top and bottom, and closing by a lid or flap on hinges. The handle of the shovel is hollow for a sliding rod, connected with a piston, nearly filling the width and height of the box. By giving motion to the rod within the handle, the piston is made to press against the lid and force it open. The shovel is brought into action by filling it with coals through the lid, which is then closed, and the box with its contents passed into the fire upon the horizontal grating on which the fire rests. By continuing a pressure against the piston rod, and withdrawing the box or shovel, the whole of its contents are deposited upon the grating under the burning fuel. A sliding metal plate may be applied under the fire grating after the supply of fresh coal until the heat shall have caused a small degree of adhesion, when it may be removed or, if hinged, suffered to drop down.

GEORGE ATKINS, Drury-lane, and **HENRY MARRIOTT**, Fleet-street. 1825. No. 5,190.

Improvements and Additions to Stoves and Grates, to remedy Smoky Chimneys and Economise Fuel.

For effecting the combustion of smoke by attaching a box or chamber to the back of any open fire-grate or register-stove for the reception of fuel. The bottom of the coal-chest slopes forward at a considerable angle, and communicates with the back of the fire-grate by an opening of parallelogram or other shape. Near the top of the coal-box is an aperature higher up in the back of the fireplace, with a closely fitting lid. When the grate requires replenishing the lid is raised and coals thrown into the chamber, which, immediately on reaching the bottom, roll down through the lower opening into the back of the fire. The dense smoke usually evolved from fresh coal is thus obliged to pass through the incandescent fuel, and is there destroyed. This stove dispenses with the necessity of a fender, being set upon a basement which is hollow, and within which is placed the ash-pan or drawer provided with a sliding ventilator. The basement may be of marble, or stone, or metal.

Appendix.

GEORGE TILLETT, Snow-hill (Ironmonger). 1846. No. 11,035.

Improved Fireplace.

The fire-grate is moveable and has no bottom or grating. The space beneath is enclosed and occupied by a coal-box or receptacle for fuel, which, by using the poker as a lever, is drawn up at will by a concealed arrangement of chains and pulleys. Situated at the bottom of the stove under the fuel-box is a horizontal air passage communicating with a vertical flue behind for the supply of fresh air to the fire through the perforated back of the fire-grate. When the fuel-box requires to be replenished the fire-grate is made to travel backwards, so as to leave the mouth of the fuel-box open for a fresh supply. The grate when pushed back rests upon rollers, travelling upon a support plate which rests upon brackets. The coal-box being filled, the grate is brought back to its former position. The back of the stove is provided with an aperture for admitting the draught necessary to maintain an uniform state of combustion.

JOHN WILLIAM JEAKES, Great Russell-street, Engineer. 1854. No. 1,168.

Improved Construction of Stove Grates.

By providing the stove grate with a receptacle underneath to contain about one day's consumption of fuel; the front, or curtain of the fuel box, and the bars of the grate are made in one, and move together in a sliding frame. The fire is lighted in the open grate, and the smoke slowly emitted from the coals, in the air-tight receptacle below, is consumed in passing through the fire above. When fresh coal is required, the sliding frame with the bars and curtain is slightly lowered by turning a key in front of the stove grate, which gives motion to a rack and pinion behind. A fresh portion of coal is thus brought into combustion between the open bars of the grate. A space is provided below the floor to permit the depression of the curtain as the fire becomes low. In front, instead of a stone hearth, is a removable metal screen, covering an ash-pit, for the reception of the ashes which fall from the fireplace.

GEORGE HENRY BACHHOFFNER, Upper Montague-street, Middlesex. 1854. No. 2,612.

Improvements in Fireplaces for the Consumption of Smoke, Lighting Fires, &c.

Above the ordinary fire-grate is placed a supplementary grate, capable of being moved up and down, or sustained at any point, by rack-work motion. In this grate is maintained a fire of anthracite, or other non-bituminous fuel; and in the lower grate a fire of ordinary coal. In use, the upper grate is brought close down upon the fire in the lower grate, the smoke of which rises into the upper fire, and is there consumed.

If preferred, instead of using two separate kinds of fuel, the coals in the lower grate, when sufficiently coked, may be lifted with a shovel into the upper grate, and fresh coals added below, for which purpose the upper grate is to be raised.

JOHN RAWE, Haverstock Hill, Middlesex, Gentleman. 1854. No. 1,323.

Improvements applicable to Fire-places and Stoves.

For preventing the emission of dense masses of smoke from fresh coal by supplying it from below upwards into the fire, instead of on the top or surface; the fuel is stored away in a receptacle at the side of the stove, between the cheeks and the brick-work setting; a part of the stove in front being made to turn on hinges to permit access to the chamber. For the purpose of transferring the coal from the receptacle into the grate, a tube or feeding pipe proceeds up through the grate into the fire. A piston is made to fit this pipe or channel, moved by a lever and toothed quadrant, acting on a rack attached to the plunger. The apparatus, in its action, resembles that of a force-pump, and is worked by a lever within a socket, in connexion with the axle bearing the toothed quadrant. The poker serves for the lever, and should be made of sufficient strength for the purpose. The coal supplied through the feeder must be broken small. The object of the invention is to produce a bright and clear fire, improve the draught, and cause small coal and screenings to be available for domestic fires.

THOMAS STEVEN, the "Milton Foundry," Glasgow, Ironfounder. 1856. No. 355.

Improvements in the Construction of Open and Close Stoves.

As applied to register stoves or open fireplaces, by fitting to the stove a coal-box underneath. The fuel is raised to the level of the fire as required, by the under plate of the coal-box working in vertical guides, by a lever applied in front through holes made for the admission of air into the fuel receptacle, and maintained in its position by means of rack and pinion. For creating a better draught the flue at the back of the grate is constructed of tubular form, is carried higher up than usual into the chimney, and its mouth closed with a damper or sliding shutter, which admits of regulation.

Another improvement applying to fireplaces consists of a double bottom of two gratings, one of the gratings being made to slide over the other, which is stationary, and thus contract the ascending currents of air through the fuel as required. The sliding grating is moved by means of a handle in front.

HENRY ELLIOTT HOOLE, Green Lane Works, Sheffield, Manufacturer. 1856. No. 173.

Improvement in Stove Grates.

The stove is supplied from a coal-box below the grate, the bottom of the fuel-box consisting of a moveable horizontal plate, raised or lowered at pleasure by chains and other gearing. To obviate the unequal lifting of the plate at its opposite ends, the chains are connected with the barrels so as to wind and unwind simultaneously. The grate which contains the fire is inclosed within open vertical bars, a similar series extending in a vertically inclined plane downwards from the lower part of the grate to the hearth, and serving to inclose the refuse fuel, which falls through into an ash-drawer below. The lower series of open bars extends forward sufficiently to act as a fender, and to form a handsome façade to the fireplace. The front of the fuel-box is concealed from observation, being situated in the plane of the fire-bars, and forms the back of the chamber or enclosure, of which the lower series of open bars is the front. The back of the grate is composed of a semicircular fire-brick, with grooves on its surface, which extend vertically downwards below the bottom movable plate of the fuel chamber. By this means a portion of the air entering between the bars of the apron and under the fuel-box, passes up the grooves to the fire-brick at the back, and is distributed through the incandescent fuel. The stove is closed with a compound register, formed of two concave circular plates with a series of openings for the passage of the smoke. These two plates or frames are arranged above each other, so that the spaces of the one are opposite to the solid parts of the other. By one of the frames being rendered moveable, the openings are closed or diminished at will; a screw in front of the stove being made to perform the movement. The external arrangement for lifting the coal-box is a shaft rotated by a key.

WILLIAM OWEN, Rotherham, York (Iron Master). 1856. No. 106.

Improvements in Stoves and Fireplaces.

By casting in one piece nearly all the parts of the stove coming into immediate contact with the fire, and situated so as to receive the greatest amount of heat by radiation and reflection, including also the hearth-plate, which is likewise cast in one piece with the rest. The grate when required may be constructed for the supply of fuel from below, and is varied from the arrangement known as Arnott's, by interposing between the fire and the fuel underneath, a hollow box or double grating to receive the dust and ashes, and prevent them falling from the fire above on to the fresh coal beneath. The fuel-box is divided into separate charges for each supply, by double gratings placed at suitable intervals, and supported at any height required by moveable stops within the box. When the fire requires to be fed, the whole mass of fuel is pushed upwards by means of a simple adjustment in the hearth-plate. As soon as the first in order of the double gratings is made to rise above the level of the lowest bar of the fire-grate, it is pulled out in front and deposited away in a drawer provided for its reception. The fire and the fresh coal are thus allowed to come in contact, and the succeeding box or double grating occupies, with regard to them, the same position as that which has been removed.

The object of the arrangement is to obtain a bright and clear fire, combined with the advantages of feeding from below, by a supply of air under and up through the fire, and to preserve the fresh coal when applied free from any admixture of dust and ash. The coal box is concealed from view by a projecting apron, inclining forward in a downward sweep to the hearth-plate. The apron is a characteristic feature of this fireplace, and freely allows the passage of the air through the open work of the ornamental castings.

Another arrangement, but not self-supplying, is effected by placing a second and close grating beneath that of the fire-grate. The small fuel falling from the fire above remains on this lower grating in a state of combustion, the ash-pan underneath receiving the dust and ashes of both fires.

The fireplace may also be constructed with a descending flue, passing round at the sides and underneath, for the purpose of diminishing the amount of smoke, the fire-grate in this case being supplied with fuel in the ordinary way. By surrounding the flue with a double casing, and admitting cool air from below, a reservoir of heated air may be retained for distribution when and where required.

JOHN LEIGHTON, Brewer-street, Golden-square. 1856. No. 663.

Self-consuming Smoke Consumer.

For promoting cheapness, cleanliness, and comfort. The fireplace is constructed with a chamber at the back and sides for the reception of the fuel, covered in on all sides, excepting where it is in communication with the fire. The smoke and gases from the coal, therefore, find no exit but into the fire, which is maintained by the previously coked fuel, contained in the surrounding chamber, and drawn forward by the poker when required. The coals of to-day, by this arrangement, becoming the coke of to-morrow.

SECTION II.

PREVENTION OF SMOKE BY A DOWNWARD CURRENT.

BENJAMIN CHARLES COLLINS, Salisbury, Wiltshire. 1791. No. 1,798.

A new Construction of Grate: to be used in or out of a Chimney.

The intention of the inventor is not so clearly expressed in the specification as we could desire, but the substance of the invention is as follows: the fireplace is enclosed, excepting in front of the fire-grate, so as to form flues, one on either side, with an aperture entering into them, under the grate, about three inches above the hearth, the ash-pit being closed with a sliding plate, and the top of the stove covered in with an ordinary register. The air for combustion is supplied over the fire, and passes down through it, and through the apertures beneath, and into the side flues. The side flues are provided with regulators for the admission of air, and the plate before the ash-pit has a sliding adjustment, which together with a means of opening or closing the register above, afford a means of regulating combustion, and maintaining it at a sufficient intensity to prevent the formation of smoke.

JOHN MARSH, Burnt Tree, near Dudley, Worcester (Manufacturer). 1856. No. 924.

Improvements in Fire Grates.

For the prevention of smoke and the obtaining a more perfect control over the draught than in ordinary fire-grates, by means of a flue at the back of the grate extending upwards from the base of the ash-pit into the chimney. The lower orifice of the flue is closed or diminished by a horizontal sliding plate underneath. An open arch extends over the fire, furnished with a door or valve of corresponding form, turning upon a joint, to admit of its being thrown back to allow a passage for the products of combustion up through the flue behind into the chimney. At the back of the grate are openings communicating with the flue, the relative quantities of air passing up and through which may be adjusted at pleasure. On lighting the fire, the door is thrown quite back, to allow the flame, smoke, &c., to pass directly up into the chimney. When the fire is thoroughly lighted, the door is closed, or partially elosed. The air then descends over and through the fire, and passes out at the apertures in the back of the grate into the flue behind. The downward current thus established consumes or rather prevents the formation of smoke. The draught up the flue may be regulated by the sliding plate below, which can be withdrawn entirely for the removal of soot, ashes, &c., accumulating from above.

ALEXANDER WILLIAMSON, University College, Gower-street. 1855. No. 670.

Improvements in Stoves and Fireplaces.

The back of the fire-grate is an open grating of iron or fire clay, behind which is a flue communicating above with the chimney. To this flue there is a perpendicular valve or register, which forms the back of the fireplace, over which is an horizontal flap or register. When the register of the flue is thrown back, the draught passes direct into the chimney; when the register is vertical, and the flue thrown open, the draught is downward, through the fire, through the back of the grate, and into the flue behind.

SECTION III.

FIRE-GRATES FOR CONSUMING SMOKE BY MEANS OF HOT AIR CHAMBERS ABOVE.

EDWARD NEWTON, 66, Chancery-lane, Civil Engineer. 1849. No. 12,634.

Improved Fireplace.

The fire-grate is set far back in the chimney-place, near to the ground, and is surrounded on all sides, but not in front, with a metal casing for retaining and distributing heated air. Over the fire-grate is a triangular metal hood, projecting forward from the back of the chimney-place, to a level with the front. A vertical plate or blower partly fills up the open front of the fireplace, and forms one side of the hood, the top of the metal casing a second, whilst an inclined plate, sloping from the back part of the top of the casing, to the lower edge of the blower in front, forms the third side of the triangular chamber. This chamber is designed to effect the combustion of smoke which passes into it from the fire below, through small apertures in the inclined and undermost plate; the incombustible gases passing away through a circular flue above into the chimney. The casing of the fireplace in which the stove is recessed is hollow, to form a surrounding air chamber, into which a supply of air is continually passing, through the open work of the stove facings, to issue again, in a tempered state, into the apartment. A pipe may be led through the smoke-consuming chamber into the space between the casings, on each side, to raise the temperature of the already heated air, by causing it to come in contact with its surface. In front of the fixed vertical blower (or front of hot air chamber) is a moveable screen of tubes of glass, set in a light frame, and easily moveable up, and down, by pulleys and weights behind, to assist the draught of the stove. The back and sides of the fire-grate are made of fire-brick; the grate is not attached to the sides of the fireplace, but is supported on feet, and is moveable, for the purpose of being taken away to be cleaned and made ready for lighting. The ash-pan below, and the fire bars, are rendered easily removable.

Henry Olding, Lambeth, Surrey, Civil Engineer. 1854. No. 297.

Improvements in Stoves.

The back of the stove is formed of a metal grating, inclining slightly backwards towards the top, but not extending quite to the level of the horizontal fire-bars, on which the fuel rests, to permit an aperture of communication between the fire and a flue behind, which extends down into the ash-pit. A throat-piece or valve is placed in the flue, at about the level of the fire-grate, for regulating the admission of air to the flue and to the fire. The stove is closed with a register plate above and one below, the upper plate being closely fitted to the chimney aperture, and inclining from above, downwards; the other from below, upwards; and both extending from the vertical back plate of the stove, the three together forming a triangular hot-air chamber, of which the under register plate is the base. The three sides of the triangle, however, do not form a contact with each other, but are slightly separated, that the heated air, smoke, &c., may find an entrance into the chamber, the incombustible gases, &c., passing out through a long narrow aperture beneath the upper plate, into the flue extending up from the back, and out of a small orifice which terminates the mouth of the flue, and is the sole aperture of escape into the chimney.

Rotary or Inverting Grates.

Jeremiah Spencer, Great James-street, Bedford Row (Gentleman). 1818. No. 4,316.

Improvements of certain Descriptions of Fire Grates for more easily Effecting the Combustion of Smoke.

By means of a grate made to turn upon its axis, so that by inverting it the coals put upon the top of the burning fuel may be brought underneath. The fire is thus made to kindle downwards, that the smoke as it ascends may pass through the fire and be there consumed.

Charles Jacomb, Basinghall-street, London (Wool Broker). 1825. No. 5,257.

Improvements in the Construction of Furnaces, Fire Grates, &c.

The fireplace consists of a cylinder which revolves on a hollow axis, the bars being arranged longitudinally. The cylinder or fire-cage is closed at either end, and is divided lengthways by open gratings into three equal compartments, each of which has a door in the end plate. Through these doors the compartments are charged; when the fire in any one of them has been lighted and burnt clear, the cylinder is gently turned, so that the coal immediately beneath or contiguous becomes ignited, and the smoke from it obliged to pass through the fire, where it is consumed. The axis on which the grate revolves is hollow, for the supply of a current of atmospheric air to the compartments, and is set in motion by a lever, or any other convenient arrangement, according to the size and adaptation of the grate, which is supported on feet or standards at the necessary elevation above the floor. The above arrangements are chiefly applicable to a furnace, but when modified apply equally well to a domestic fire-place.

James Woodford, Hatton Garden (Watchmaker). 1854. No. 613.

Smoke-consuming rotary Grate.

Consists of a cylinder of bars, the ends of the cylinder either closed or perforated; the bars are arranged longitudinally, and the grate is divided into compartments by inner gratings extending from end to end. The entire cylinder turns upon an axis mounted

Appendix.

mounted between the cheeks of a stove, and is made to revolve by turning a handle in front or at the side of the fire place. The object of the arrangement is to effect a more complete consumption of the products of combustion, by placing the fuel in one of the compartments, and adjusting the position of the grate so that the products of the fresh fuel may pass through the fire in the next compartment. The bars on the periphery of each compartment are rendered movable for the supply of fuel; and at the back, and partially under the grate, is fixed a shield or covering plate to receive the ashes.

JOHN BAINBRIDGE, Ely Place, Holborn Hill (Agent). 1854. No. 1,617.

Improvements in Fire Grates, Furnaces, &c., for the Consumption of the Smoke, and for greater Amount of Heat.

The grate consists of a skeleton cylinder of bars turning upon an axis constructed of iron, or fire clay, the ends being carried by suitable bearings into the sides of the fire-place. The cylinder is either opened or closed at its extremities, and has both a vertical and horizontal motion upon its axis, that it may be turned when requisite to present a fresh portion of fuel to radiate its heat into the apartment. Two or more bars are rendered moveable for the admission of fuel to the grate.

GEORGE KENNEDY GEYCHIN, Camden Town, Middlesex. 1854. No. 1,221.

A cylindrical grate capable of inversion or rotation after each supply of fuel, to effect the combustion of the smoke.

WILLIAM YOUNG, Queen-street, Cheapside. 1855. No. 646.

Improvements in Stoves and Fire-places.

For the prevention of smoke. The fire-grate is made to consist of a partly cylindrical frame of bars closed at either end by a circular plate. The cylinder is divided longitudinally into two compartments by a dividing plate, in connexion with two circular side pieces, turning on an axis within side the end plates of the cylinder, and half their diameter in depth; it is retained in any required position by means of a stop. To the cylinder is a close flap or lid, which is raised for the purpose of putting in fuel, but is closed at other times, so that the products of combustion may not pass through. The fresh coal is thrown at the back of the dividing plate, which is then turned, so that the fuel may be driven underneath the fire in the grate, and the dividing plate afterwards returned to its former position.

SECTION IV.

FIRE-GRATES FOR PROMOTING SMOKE IN PART BY DEFLECTING HOT AIR DOWNWARD, AND BY DIRECTING COLD AIR DIRECT INTO AND THROUGH THE FIRE.

COUNT DE ROBIEN, East-street, St. Marylebone. 1795. No. 2,071.

An economical Fireplace.

Above the fireplace is suspended a moveable reflector, in form either elliptical, spherical, or flat, and furnished with a cover of similar shape to itself. The grate has a hole in its centre, through which passes a pipe or channel for the supply of air to the fire in thin jets or streams through perforations in the pipe. The reflector is of value not only by throwing back the heat, but by preventing smoke, the cover becoming in some sort as a reservoir for the products of imperfect combustion which do not readily escape. The perforated air-distributor within the fire has a great tendency to diminish its amount by promoting a more perfect degree of combustion.

JOHN LESLIE, Conduit-street, Hanover-square, (Tailor). 1845. No. 10,501.

Improvements in Stoves and Apparatus used in Consuming Fuel, and in Ventilating.

The fire-grate is situated very near the floor of the room; it is shallow in depth, but allows a good frontage of fire surface, and the back of the grate is made of fire-brick. For the ventilation of the room a long opening is made within the chimney from two to four inches in width, extending from the back of the grate to the cornice in the ceiling, which creates a constant draught between the room and the chimney. The opening is closed wholly or partly at pleasure, by doors, slides, or shutters, one above the other, hinged to the side of it. The object of these arrangements is to afford increased heat with economy of fuel, and a healthful ventilation by carrying off the impure air of the room through the long opening into the chimney.

LEE STEVENS, 1853. No. 1,215.

Improvements in Grates and Stoves.

By the admission of hot air behind the back-plate of the grate, about or above the level of the fire. The air previous to its being deflected, passes through channels or passages formed underneath or at the side of the grate, and is then deflected under an inclined metal guard over the fire, with the view of assisting the combustion of the gases arising from the coal.

SECTION V.

IMPROVEMENTS IN THE FORM OF REGISTERS.

RICHARD WEIGHTMAN, Carlton-upon-Trent, Nottingham (Gentleman). 1795. No. 2,056.

Improved Register Stove.

The flap, or register top, in form is either circular or flat, and is perforated or divided into open flutes, "to cause the fire to burn more brightly, and to give out greater heat;" beneath the flutes is a moveable metal plate, to close the apertures wholly or in part, according to the draught required; the register back is likewise perforated or in flutes. On a level with the horizontal bars on which the fire rests is a sliding metal plate, which on being drawn forward, brings with it the back of the grate, to which it is attached for the purpose of diminishing the size of the fire at will; on being drawn wholly forward, so as entirely to cover up the lower grating, the fire is speedily extinguished. At the back of the grate is a receptacle into which the cinders and ashes may be thrown, communicating with the ash-pit, which is simply a drawer situated underneath and in front of the fire-grate, at some height above the level of the hearth. An upward heated draught is supplied to the fire through the ash-pit, or drawer, and likewise through the flutings behind from a valve concealed in the fittings of the stove, the design of which is plain and in very good taste.

MATTHEW WYATT, Queen Ann-street, East, Middlesex. 1802. No. 2,669.

Fire-grate upon an improved Plan.

The fire-grate is made to turn upon a pivot, so that its contents may be emptied through the bars into a chamber at the back. The top of this chamber slopes downwards towards the fire-grate, and is covered by a lid beneath which is a grating; over this grating, when the lid is raised, the contents of the fireplace are emptied, the cinders rolling back again into the grate, the ash, &c., falling through into the chamber, and from thence into a drawer below. A register is fitted to the chimney capable of various adjustments for regulating the draught, and when the fireplace is not in use, for totally excluding the air if required. On either side are circular pieces of wire-work which draw out, and meet before, and at a distance from the fire, as a means of security from sparks, &c. There is also a concealed arrangement of tubes from the stove to the floor, for the prevention of dry rot.

JOHN JUSTICE, Dundee, Scotland, Ironmonger. 1810. No. 3,313.

Improved Grate, to cure Smoky Chimneys.

The grate is similar in appearance to an ordinary register stove, and is moveable up and down between the outside cheeks, that it may be lowered to the hearth when wood is employed for fuel, or adjusted to any height required to regulate the chimney draught, and reduce the liability to smoke. A blower also is attached to the front of the fire-place, adjustable at pleasure, or to be drawn quite away when not in use.

ISAAC WILLSON, Bath, Gentleman. 1813. No. 3,763.

Improvements in Fire Grates to prevent Smoky Chimneys and obtain an increased Amount of Heat from the same quantity of Fuel.

A stove grate, of the ordinary form, is employed, with an open fireplace, fitted at the back with a metal pipe for conducting the smoke, heated air, &c., down on one side the fireplace, and behind the back, or through the fire, across to the other side, where it ascends through the pipe into the chimney. The chimney aperture is closed by an exactly fitting moveable cover; the orifice of the pipe is the sole aperture of escape into the chimney.

JOHN EDWARDS, Bow-street, Covent Garden. 1804. No. 2,795.

Improvements in Fire-places, to prevent Smoky Chimneys, economise Fuel, and increase Heat.

By closing the top of the stove-grate with two inclined metal plates, which rest on vertical side pieces, within the setting of the fireplace, and form a kind of pointed roof

Appendix.

The plates do not form a contact with each other, but are arranged so as to leave a narrow aperture between for the passage of the smoke; to prevent the descent of rain, or the return of smoke by downward currents, the one plate, extending from the front upwards, to the back, is made slightly to over-lap the other. This roof-like arrangement is designed to increase the draught by providing only a narrow aperture of escape into the chimney, and to diminish the amount of heated air passing upwards; also to reflect back the heat of the fire into the room.

George Stevens, Stowmarket, Suffolk, Brewer. 1839. No. 7,947.

Improvements in Register Stoves.

The fire is maintained within an ordinary open grate, around which air is admitted through apertures in the stove facings, to be passed by separate arrangements of flues, behind the fireplace, round over the top, then downwards, and finally through perforations in the fire-brick, forming the back of the stove, into the chimney, the aperture of which is contracted, with the view of retaining the heat below, and creating a more effective upward draught. In the upper part of the stove facings are regulators for the ventilation of the room, and on each side two simple adjustments, the one for regulating the heat of the fire, the other for creating a draught on first lighting, &c. The metal facings of the stove are cast, so as to present a good radiating surface. This form of construction is adopted with the view of allowing the warm air of the room to escape only at a sufficient rate to produce the necessary circulation and to prevent the unpleasantness of a rush of external air when the door is opened. The grate is intended to burn coke in preference to any other kind of fuel, and is economical in its use. The intensity of the fire may be regulated at will.

John Slate, Wandsworth, Surrey, Accountant. 1850. No. 13,312.

Improvements in Fireplaces.

For the prevention of smoke and the creation of a better draught in chimneys. By the construction of double cheeks to the fireplace, of which the inner cheeks are moveable, that they may be drawn forward from the sides, and cause the draught of the fire to be increased. The register plate is inclined upwards from the front to the back of the chimney. The patentee prefers to make the front bars of the grate vertical, instead of horizontal, and to incline them slightly in a vertical plane inwards.

Charles William Grant, Bath, Somerset, Lieutenant-Colonel, Indian Army. 1854. No. 2,622.

For the prevention of Smoke, and production of Draught in Fireplaces.

To avoid breaking the continuity of the draught, between the fire and the chimney by the large open space below the entrance to the flue, a funnel or conical shaped tube is fitted to the register cover, and led some distance up within the flue. The register cover is carefully fitted to the chimney aperture, and the passage of the air regulated in its ascent is by a valve in the neck of the funnel.

François Arsene Vasnier, 32, Essex-street, Strand. 1855. No. 168.

Improvements in Fireplaces.

By the adaptation of "a smoke-preventing, draught-creating apparatus," simply consisting of a four-sided frame, which is placed at the back of the fireplace, in a direction more or less slanting from back to front, so as to obstruct the passage into the chimney; a plate consisting of two parts is fitted into the frame, the lower part fixed, the upper hinged to it, and moveable; by means of two circular racks, one at either end, the upper moveable plate may be placed at any required inclination, to regulate the opening for the passage of the heat and smoke; in this manner the draught and heat-reflecting power of the fireplace is designed to be greatly increased, and subjected to regulation. The frame must be carefully fitted to the particular chimney to which it is applied.

Section VI.

For economising and utilising Heat by returning warm Air into the Apartment.

George Richards, Truro, Cornwall (Architect). 1822. No. 4,744.

Improvements in Grates and Stoves.

By constructing the grate with metal fittings, and leaving between the back of the fire-grate and the brickwork setting, a space of about two inches or more, to form a "rarefying box,"

box," or tightly closed chamber, excepting where it opens by a valve above into a flue at the back of the chimney, and below for the discharge of soot when the flue is cleaned. The hearth is constructed of two pieces of metal, the one plane, the other perforated and moveable, the space between the two forming a repository for the ashes, dust, &c. At a suitable height above the grate is a regulating valve, so that, in the event of a sudden gust, the smoke, which would otherwise be driven into the room, is conducted into the "rarefying" box, and its ill effects there destroyed.

THOMAS GAUNT (Gentleman), Chapman-street, Islington, and GEORGE FREDERICK ECKSTEIN (Manufacturer), Holborn. 1831. No. 6,108.

An improved Fireplace.

The grate is set so that the range of bars enclosing the ignited fuel may project into the room, and cause the fire to emit a greater degree of heat; over the fire, to act as a smoke conductor, a dome or canopy is placed, the smoke passing through an aperture immediately beneath the dome into the chimney. An apparatus of chains and pulleys at the back gives motion to the grate, which may be raised or lowered under the canopy to regulate the speed of combustion. From the upper surface of the canopy a considerable degree of heat is imparted to the air of the room.

JULIUS JEFFREYS, Kensington (Gentleman). 1838. No. 7,603.

Improvements in Fireplaces.

The fireplace is set prominently forward from the wall of the apartment, and the space at the back of the fire-grate above the fire is fitted with an apparatus of flat tubes, about an inch apart, and placed edgeways, standing up to the mantelpiece in front. A space of several inches is left between the apparatus and the back of the chimney, and the grate itself is moveable backwards and forwards, so as to allow the air to pass up between it and the apparatus, and direct the smoke and heated currents above the fire upwards and between the flat tubes. These tubes are connected below with a small air-chamber communicating with the external air, which in its passage up the pipes becomes heated by the ascending and hot air currents playing about them, and is returned into the apartment through the upper orifices of the tubes, which open into the mouldings of the mantelpiece. The side jambs of the stove are of marble or other ornamental material, and the mantelpiece, from its depth and extent of surface, assumes the character and utility of a side-table. The stove is ornamental, and exposes a larger amount of open fire surface than most fire-grates, with the same amount of fuel, and, standing forward, is in a more favourable position for emitting heat.

ALEXANDER HILL, Gower-street, Bedford-square (Surgeon). 1840. No. 8,360.

Improvements in Fireplaces for economising Fuel and Heat.

By warming a stratum of air with the heat which would otherwise escape up the chimney without being used, the air so heated being passed into the apartment. This is effected by enclosing the fireplace at the sides and back with a double casing, and making a hollow space underneath the hearth. A pipe in connexion with the external air conveys under the hearth and through the chamber at the back and sides of the grate a current of cold air, which, when warmed, is passed through a conducting pipe to any part of the same apartment, or any other that may require warming.

THOMAS SYSON CUNDY, Cutler-street, Houndsditch (Builder). 1844. No. 10,248.

Improvements in Stoves and Fireplaces.

By the admission of cold air from some external source, to be conducted into hot air chambers at the back and through the sides of the fireplace, and diffused when heated over and above the fire, the quantity and rate of admission of the air supplied from without being regulated according to the demands of the fire. The back of the fire-grate is made of fire-brick, and the space below the fireplace is enclosed with a blower, through which air is admitted or cut off at pleasure by a throttle valve. The stove closes at top with the ordinary register. The arrangements are intended to prevent draughts, or tendency to chimney smoking into the room.

MALCOLM MACLAREN JOHNSTONE, Renfrew, North Britain (Surgeon). 1853. No. 2,495.

Improvements in Fireplaces.

Relate to a grate which in its general features resembles an ordinary fireplace. The grate itself is covered over on a level with the top of the front bars by a flat grating, which has a circular opening in the centre fitted with an adjustable plate or cover. When the cover is off, the draught ascends directly upwards into the chimney; when the cover is closed, it is directed through lateral openings in the body of the grate, one on each side, into the cheeks of the stove, and directed upwards and about by various arrangements of flues and chambers, so as to heat to the full extent the front metal surface of the grate. The mantelpiece and its vertical supports on either side are cast in metal, or fire clay, or other suitable material for conveying heat, and are thus made to continue the action of the fire, the hot air being made to traverse the space behind, and to pass out into the room through openings in the ornamental castings. The heated currents are controlled by valves in connexion with a button, one on each side in front, and one above the grate. The products of combustion are suffered to escape up the chimney, in every mode of arrangement.

JOSEPH SALTER, Manchester (Gentleman). 1855. No. 2,954.

Improvements for promoting Draught in Chimneys, and ventilating Apartments.

By surrounding the fire-grate with an air chamber, into which air is supplied from some external source, to escape when heated through openings in the chamber, for the purpose of increasing the upward draught. The additional current of air thus created is under regulation by means of a valve.

For ventilating the apartment, a siphon is employed, the longer leg of which extends nearly to the ceiling, and the shorter leg to within a short distance of the fire. The air within the shorter leg becomes heated, and specifically lighter than that of the apartment, the air from the upper part of which is thus caused to descend the longer leg of the siphon, and to pass from thence upwards into the chimney.

JOSEPH SCUDAMORE, Micheldean, Gloucester (Gentleman). 1856. No. 468.

An Improvement in Domestic Stoves and Grates.

By surrounding stoves and grates with an air space or jacket at the sides and back, closed at the top to prevent communication with the chimney. The sides and front of the stove in connexion with the air space are constructed of perforated or open plates, that the warm air may be dispersed over the apartment instead of being absorbed into the brick work of the setting.

GEORGE HALL NICOLL, Dundee (Ironmonger). 1855. No. 2,822.

Improvements in Fireplaces.

To combine the economy and heating power of a good stove with the elegant and cheerful appearance of an open fire-grate. For this purpose the front plate of the fireplace instead of being recessed, as is usual, has its entire surface flush with the line of the wall, so that the grate or fire holder projects out into the room. Above the grate and extending over it from the front plate is a canopy of metal work, to collect the smoke and direct it through an opening underneath itself into the chimney flue, a damper being provided to regulate the draught through the opening. At the back of the front plate of the stove, and cast with, or attached to it, are a number of horizontal plates, or shelves, inclosed on all sides by a casing which forms a box or chamber for their reception, at the back of the fireplace. The shelves are placed so that the central horizontal layer is open to the sides, and two intermediate layers, one on each side, are open to the centre. The air is admitted within the casing by a pipe in communication with the external air, or by an opening in front of the stove. The air in its tortuous course up between the shelves and the back of the fire-place becomes heated and finds an ingress into the apartment, through apertures above and around the canopy, in great measure concealed by the open work pattern of the casting.

SECTION VII.

FOR ECONOMISING FUEL AND HEAT BY COMBINING REFLECTION FROM POLISHED SURFACES, WITH CONDUCTION AND RADIATION.

JOHN ANDERSON, Rugby, Warwick (Ironfounder). 1852. No. 1,167.

Radiating Ventilating Grate for remedying Smoky Chimneys.

The grate is formed of a series of iron bars in concentric curves; beneath the hearth is a hot air chamber which is supplied with air from out of doors, by a pipe of glazed potter's ware or other smooth material, and communicates with two chambers, one on either side, formed by the cheeks of the fireplace, with openings near the top for the admission of the warm air into the apartment. The foundation of the grate and back part of the hearth are of brick, but the front hearth and cheeks and facings are of polished steel, or of glazed pottery ware. The grate is low and somewhat deeply recessed, and underneath is placed an ash-pan of steel. The object of the invention is to obtain the greatest amount of heat derivable from radiation and conduction, aided by reflection from polished surfaces, together with a constant flow of warm air into the room, supplied from some external source. The escape of the vitiated air is provided for by a ventilator placed above the fireplace near the ceiling, the spent air escaping by a pipe into the chimney flue. The draught upwards through the supply air-pipe below facilitates the ascent of the smoke in its passage up the chimney.

BARRODALL ROBERT DODD, Change-alley (Civil Engineer). 1805. No. 2,839.

Improvements in the Construction of Fireplaces.

By means of polished metal reflectors placed on either side of the fireplace, and so arranged that they may slide away into a recess provided for them in the wall, or turn round, to allow of being placed at an angle best adapted for producing a draught on first lighting the fire, and for reflecting the heat when it has burnt bright and clear. To this grate is likewise an extinguisher or metal case for putting over the fire, and causing it, when no longer required, to be extinguished, without dust or waste of fuel.

JOHN SHERINGHAM, Edwardes-square, Kensington-square (Gentleman). 1852. No. 1,019.

Improvements in the Construction of Stove-grates.

By placing above the stove a flap or damper, which turns upon pivots, and may be raised or lowered at pleasure for regulating the draught. For obtaining a more extended radiating surface, the opening below the fire bars is filled in by a metal apron, inclining forward from the lower part of the grate to the hearth or platform, at an angle of 60 degrees; the triangular spaces at the sides being filled in with side or gusset pieces. The apron turns upon pivots, and may be adjusted horizontally, to answer the purpose of a domestic footman, or vertically, to serve as a fire-guard. The upper part and cheeks of the stove are of highly polished metal, to act as reflecting surfaces, and a space or chamber is provided all round between the casing and the brickwork to serve as a generator and reservoir of heated air, which is supplied through perforations or gratings near the floor, in the vertical sides of the mantelpiece, to escape when heated through similar apertures placed higher up.

GEORGE WRIGHT, Sheffield, also of Rotherham, York (Artist). 1852. No. 14,004.

For the purpose of gaining additional heat by conduction, the front bars of the grate are cast in one piece, with a metallic plate or surface extending into the room. For the further increase of heat the bars, which are vertical, are inclined in a vertical plane inwards, so as to overhang and partially cover the fire; by this arrangement they become greatly heated, which heat is carried by conduction to every part of the metal surfaces extending from them. The ash-pan is sunk below the level of the hearth, and may be drawn out without disturbing the heavy casting of the metallic surfaces.

The same arrangements have been applied by the patentee, with little variation, to an open stove, with a slight deviation in regard to the form of the back, which is curved and somewhat overhanging, with the view to intensify the heat of the fire, and by radiating it forward, to lessen the amount of smoke. The grate is enclosed on all sides, but not in front, with an ornamental casing, and the products of combustion are passed away at the back, through an exit flue leading into the chimney.

SECTION VIII.

OPEN FIRE-GRATE STOVES.

JAMES SHARP, Leadenhall-street, London (Ironmonger). 1781. No. 1,304.

Curious Stove or Grate.

Resembles in appearance an open fireplace of the period. The fittings, sides, top and back of the stove are of cast-iron; it is mounted upon a raised platform or hearth, and is adaptible to an open chimney-place, or to any situation in the room, away from the walls, that may be desired; the fire-grate itself is raised above the hearth, and is sustained in front by small pillars or feet. The sides and back of the casing, to within nearly the level of the grate, are surrounded by a hollow chamber or base, through which external air is admitted by an aperture at the back into an air space or chamber extending over the back of the stove. The air space is fitted with horizontal shelves, of which the centre row is open to the sides, and the side rows open to the centre, a partition descending nearly to the bottom of the chamber; the air supplied into it is thus obliged to ascend, in a circuitous direction, between the shelves, and passes out in a heated state through two small apertures provided for its escape at each side of the stove near the top. A flue leading into the chimney issues vertically from the top of the stove, and is either long or short, according as the stove stands to the centre of the apartment, or within an ordinary chimney-place. The hollow base is provided on each side in front with an aperture and regulator for the admission of cold air into the room at times when the apartment is over-heated, and is supplied from the aperture at the back.

Frederick Austin Spalding Witler, Manchester (Agent). 1856. No. 414.

Improved Stove.

Combines the appearance of an ordinary grate and fittings, with the advantages and convenience of a portable stove. The bars are vertical, the back of the grate is lined with fire-brick, and the surrounding castings are of metal. In the hearth of the stove is an ash-pan covered with a grating. The hearth, or platform, extends forward, and is raised above the ground on feet, with a moveable fender to fit. The grate which contains the fire is attached to the stove by an axle or joint, that it may be inverted for the purpose of emptying its contents before cleaning, and laying the materials ready for lighting. The draught pipe is applied to the back of the stove near the top. Belonging to the grate are two covers, the one for applying in front vertically above the fire bars as a blower to increase the draught, the other for placing before the fire to serve as a damper. The two together when applied at the same time confine the fire securely. The stove may be either placed before the open chimney place generally containing the grate, or it may be placed away from the hearth in any convenient position. The arrangements are designed to create a better draught, and thereby cause the stove to consume small coals; also to render the fire more governable and secure than in ordinary fireplaces.

Siphon Grates.

Edward Welch, 90, Oxford-terrace, Hyde-park (Architect). 1852. No. 200.

Improvements in Fireplaces and Flues.

The fire is contained within a cylindrical fire-pot of iron, fire-clay, or stone, and is open in front with bars in the ordinary way. The smoke, instead of being allowed to ascend at once into the chimney, is conducted downward and around the fire in a siphon that it may cause the heat of the fire in the grate to be increased, and by its own heat contribute to warm the air of the apartment. To the top of the siphon is fixed a register, which allows the smoke, &c. to escape at once up the chimney when the additional heat is not required. The siphon is concealed by the front casing of the fireplace, and the heat derived from it is conducted by means of flues from the back of the grate to any room requiring to be warmed or aired.

Section IX.

Miscellaneous Improvements, including Facilities for diminishing the Dirt and Waste of an open Fireplace, attached Fire-guard, quickly extinguishing Fire, &c.

George Hattersley, Sheffield, Manufacturer. 1852. No. 552.

A radiating Hearth Plate.

Consists of two sets of bars, radiating from a centre, and adjusted to suit the stove or grate to which the radiating hearth is to be applied. The upper set of bars are fixed to a frame, with spaces between them, corresponding to the width of each bar. To afford the largest amount of radiating surface, each bar is convex, and for the same reason the frame on which the upper set is fixed is likewise slightly convex. The bars of the lower set are either flat or convex, and are fitted to a frame underneath the upper set in such manner that they are intermediate between the spaces of the upper bars, and have a lateral and vertical motion, so as to leave the spaces open when required. This arrangement is intended to promote cleanliness, by the concealment of dust, ashes, &c., increased heat by radiation, and to constitute an ornamental addition to the fireplace.

John Sherringham, Edwardes-square, Kensington, Middlesex. 1853. No. 127.

Improvements in Stove Grates.

By the mechanical arrangement of a blower in front of the fireplace, to increase or diminish the draught, according to the height at which it is adjusted above the fire; to form a screen before the ashes when lowered to the hearth; or, when raised in front of the grate, to form a protection from accidental fire. This is effected by a plate of metal, made to work on a sliding frame or carriage, moving vertically within a groove on each side of the front of the fireplace, by means of chains and pulleys, in a manner similar to a window sash. In conjunction with the blower a moveable screen may be employed, the one extending from the top of the stove downwards, the other from the base of the stove upwards. When brought in contact they cause the fire to become speedily extinguished, and when partly separated, to maintain a slow combustion.

James Macnaughtan, Great Queen-street, Lincoln's-inn Fields. 1805. No. 2,882.

A Fire-Grate of new Construction, for more effectually warming Rooms, and preventing Chimneys from Smoking.

By a sliding metal frame or regulator open at the back, and made to fit the opening of the stove or chimney. The regulator is made to slide back, on rollers, into a recess constructed for it in the back of the chimney. The flues for the passage of the heat, smoke, &c., are made first to descend, then to ascend.

William Brookes, 73, Chancery-lane, Middlesex. 1853. No. 1,334.

Improvements in Stoves and Fireplaces.

By the application of silvered glass to the inner sides of stove-grates and fireplaces, for ornament, and for the purpose of reflecting and radiating heat from the fire into the room.

Joseph Burridge, 70, Great Portland-street. 1854. No. 1,887.

Apparatus for closing Fireplaces.

By suspending shutters made of metal or other suitable material within the facing of the stove, to draw up or down, wholly or partially, at pleasure, to regulate the degree of combustion, and to extinguish the fire without dirt or inconvenience by the exclusion of air.

Thomas Waller, Ratcliffe, Middlesex (Ironmonger). 1854. No. 1,601.

Improvements in Stoves and Fireplaces.

By the construction of grates with moveable sides or cheeks to swing backwards and forwards like doors, and by this means to increase or lessen the capacity of the grate for fuel; the back of the grate is of fire-brick or tile, and the moveable sides are constructed of the same material and moulded with a beading which turns in a semicircular vertical groove on each side of the back, which is hinged with iron guides, and studs, and joints. The front bars of the grate are semicircular, or in right and left hand semicircles conjoined; the side-pieces are ornamented with facings of metal or tile-work, in which case, when drawn together in front to close in the fire, the ornamental facings alone are visible, but when thrown back to extend the fire, the facings are concealed in a recess behind the grate; the hobs push in and out according to the adjustment of the fire-grate. The fire, instead of resting upon the usual open grating within the fireplace, is supported on a base of perforated fire-brick.

George Baker and **Charles Miller**, High-street, Southwark, Surrey (Ironmongers). 1855. No. 2,187.

Improvements in Register Stoves.

To avoid the tendency to smoke in chimneys when the fire is first lighted, or fresh fuel applied in too large quantities, a pair of iron plates turning on joints are made to swing from the cheeks to the front of the stove, with sliding plates behind, working in guides to draw one from each side of the moveable iron plates, and to meet and close together above the fireplace.

Peter Brown and **George Brown**, Lancaster (Corn Merchants). 1856. No. 961.

Improved Apparatus applicable to Fire-grates.

For the purpose of separating the larger cinders, &c., from the dust and ashes, a moveable tray of network or perforated metal is placed between the bottom of the fire-grate and the level of the hearth. Between the tray or "separator" and the under part of the grate is placed a series of inclined metal bars, adjustable by means of pivots and stops at any required angle, for the purpose of reflecting the heat of the fire back again into itself. The reflectors offer no impediment to the cinders falling through on to the "separator," and the dust and ashes falling thence into the ash-pit below.

P. & G. Brown, Liverpool (Corn Merchants). 1856. No. 694.

Ash-pan for Fire-grates.

Consists of a moveable tray or sifter, fitted within side a shallow ash-pan. Upon the moveable tray a series of thin metal slips are arranged similar to louvre boards, to serve as heat reflectors, and hide the intermediate particles of dust and cinders.

Appendix.

CLOSE STOVES from 1805 to 1852.—(Various constructions).

CHARLES SEARLE, Bath, Somersetshire, M. D. 1805. No. 10,813.

Improved Stove.

A close cylindrical stove on the principle of concentrating the heat generated by the inclosed fire, by means of tubes or passages embedded in a mass of absorbent nature, such as fire-brick, sand, or stone. The fire is situated in the lower part of the stove, is enclosed in a chamber of fire-clay, and rests upon a grating above the ash-pit, a regulated amount of air being supplied to it through the ash-pit door. The top of the fire-chamber is perforated for the escape of the heated air into the various tubes or air-channels which intersect the upper part of the stove. The heated air and gases, after traversing these tubes, escape by an exit flue into the chimney. The smoke in its passage through the perforations, which become red-hot, in the top of the fire-chamber, is entirely consumed. The stove is throughout of fire-clay or pottery ware, and is designed with a view of obtaining an intense and uniform heat combined with economy of fuel.

THOMAS WATSON, Addle-hill, Doctors' Commons (Mechanic). 1838. No. 7,611.

Improvements in Stoves for heating Rooms, Halls, and other places.

The interior of the stove is divided perpendicularly in part by a division of fire-brick, the fresh fuel being supplied on one side, and the smoke and gases escaping up the other, the fuel descending by its own weight to the supply of the fire until it is exhausted. The open fire is visible in front of the stove, and is inclosed with bars inclining slightly inwards to prevent the escape of dust into the room. When the door in the upper part of the stove is opened for fresh fuel, by a mechanical and easy adjustment a swing door opens into the flue, and thus prevents the smoke from flowing into the room. The grating on which the fire rests is provided with an adjustment, for giving to it a to-and-fro movement for shaking the cinders, &c., into the ash-drawer below, which may be pushed in or pulled out for the regulation of the draught. In some varieties of this stove the fire in front is closed by a transparent door of talc, or entirely concealed behind one of metal.

SAMUEL PARKER, Piccadilly (Lamp Maker). 1838. No. 7,917.

Improvement in Stoves.

Is a cylindrical metal stove. The fire is contained within the lower part of the cylinder, and is surrounded by a closed double casing, filled with water; around the water cylinder is placed a series of pipes, connected with it at their extremities, for the purpose of creating a constant circulation in the water chamber. Leading out of the fire chamber is an exit flue, for the products of combustion, and from the upper surface of the fire chamber to the top of the stove extends a circular channel, glazed with talc, through which the state of the fire may be ascertained without removing the cover. This circular channel is surrounded by a receptacle for water, which rests on the lower cylinder, upon a projecting rim, moving in a groove of sand. The position of the grate within the inner cylinder is moveable, to aid in regulating the temperature of the surrounding water. The air for combustion is supplied by a pipe, extending from as near the ceiling as possible, in order to withdraw the least pure air from the room for the use of the fire. The amount of air supplied through the pipe is regulated by the temperature of the room in the following way. The upper part of the pipe is closed by a valve, and surrounded with an air vessel; the top of this vessel is covered with oil or water, or any other suitable fluid, out of which a pipe descends towards the lower end of the air vessel; the quantity of fluid covering the surface depends upon the expansion of the air produced by the heat of the room, and regulates the action of the valve, and consequently the amount of air passing through the supply pipe to the stove. The amount of air admitted into the stove, underneath the grate, to the fire, is subject to regulation by a water-joint in the supply pipe. Underneath the stove is placed a vessel of water, which may be raised or lowered at pleasure, and the whole is made air-tight, with the exception of the apertures provided for the supply of fresh water to the reservoirs, and for the air to support combustion. The stove is surrounded by an outer casing, open above and below, for creating a continuous circulation of air from below upwards. The water reservoir above is provided with a funnel for filling in fresh water, and the lower water vessel is provided with a tap for drawing off water when hot. A more simple form of hot water stove is described in Dr. Arnott's book on warming and ventilation, together with the advantages attendant upon its use.

WILLIAM HASPER and THOMAS WALKER, respectively of Cornhill and Birmingham,
(Manufacturers and Machinists). 1839. No. 8,065.

Improved Stove.

Consists externally of a quadrangular base, and a series of tubular flues above. The fire is inclosed in a receptacle within the base, the space between the fire chamber and the outer casing serving as a hot-air space, which if possible should be supplied with external air, to be led, when heated, by a conducting pipe to another room, or elsewhere. Above the quadrangular base is a circular arrangement of pipes, collected at top under a dome or canopy. The pipes are arranged in two concentric circles, and form ascending and descending flues, the heated air from the fire below rising up one series of pipes, passing into the dome or canopy, which thus becomes a hot-air chamber, and from thence down another series of pipes into an exit flue at the back. The central space within the concentric tubular arrangement is occupied by a feeding trunk, which continues a progressive supply according to the requirements of the fire below. The top of the feeder is made air-tight, by a circular lid fitting in a ring of sand. The stove should be kept fast closed, with the exception of the regulated and small amount of draught for combustion, and the supplies to the hot-air chamber below. The door before the fire is glazed with talc.

Stephen Joyce, Croydon, Surrey (Artist). 1839. No. 8,202.

Improved Stove.

Is a close metal stove, of elongated quadrangular figure. The centre of the stove, from the top of the casing to the grating on which the fire rests, is occupied by a conical-shaped feeding trunk, the fire, in fact, being the lowest portion of the fuel, maintained in a state of combustion by apertures for the admission of air in the casing of the fuel-feeder, which is air-tight at every other part. The fuel in the receptacle descends by its own weight, as the fire burns, and thus continues its supply until the charge is exhausted. Underneath the fire-grating is a capacious ash-pit, with considerable apertures for the admission of an upward current of air through the fire. The smoke, gases, &c., from the body of the fire pass out of the openings above the grating into the stove, and disperse themselves about the feeder, and up to and through the exit pipe into the chimney. To prevent the outer casing from becoming over-heated, the parts surrounding the fuel feeder, and traversed by the hot air, are separated by an inner lining from the outside casing. The stove is closed with an ornamental and moveable cover.

Robert Henderson, Birmingham (China Dealer and Glass Stainer). 1841. No. 9,173.

Improvements in Stoves.

The stove is of cubical form; the fire within side is inclosed in a fire-box, and is open to the apartment in front; the back of the fire-grate is inclined, to form an angle with the back of the fire-chamber, for the purpose of facilitating the descent of the fuel, which is supplied through a door in the upper part of the stove, and slides down gradually upon the fire as it is required. The fire-bars project forward in front of the stove, inclined in nearly the same parallel as the back, and admit of the fire being stirred in the ordinary way. The space between the fire-box and the outer casing serves as a hot-air chamber, a small aperture, capable of adjustment according to the required draft, opening out of the fire-box into the surrounding space, and serving for the escape of the products of combustion, which pass round and out of the exit flue at the back. In the fire-door is a semicircular opening for the supply of a regulated draught to the fire; and at the side of the stove is a regulator, to reduce, if required, the temperature of the air circulating within side. Underneath the projecting fire-bars in front is a screen or fender for the reception of the ashes; a metal plate, adjustable at pleasure, over the fire, to mitigate the intensity of combustion, is also provided.

Frederick Brown, Luton, Bedford (Ironmonger). 1844. No. 10,138.

Improvements in Stoves.

Is a stove of cubical figure; the greater part of the body of the stove is occupied by a "fire-pail" or moveable receptacle for containing the fire, and is intended to be withdrawn for the purposes of emptying, cleaning, lighting, &c. The ash-pit is situated underneath the fire, and is provided with a door and regulator; a little above is placed another door for the supply of fuel. The stove is surmounted with a conical shaped cover, from the top of which a flue leads into the chimney. The cover is slightly overhanging and raised above the top of the stove, for the purpose of creating a continuous draft upwards through the dome into the flue. The stove is prepared to burn coke, and by its construction to withdraw a greater amount of air from the room for the purposes of ventilation than the very small quantity ordinarily required to support combustion in a close stove.

Henry M'Farlane, 8, Lawrence-lane. 1852. No. 337.

Improved Stove.

Is octagonal in form, and consists of the stove compartment, which forms the base, and of the radiating apparatus above. The fire chamber in the base is surrounded by sand or other absorbent material, sustained upon a perforated plate, underneath which is a compartment filled with water; the upper surface of the water comes in contact with the lower part of the sand through the perforations, and keeps it continually moist. The radiating apparatus consists of numerous radial compartments open to the centre, but closed above and below; the centre into which they open is a cylindrical chamber, enclosing a small circular flue, divided nearly to the top; the smoke and products of the fire travel up one side of the flue and down the other, out into an exit pipe at the back. The space between the flue and the cylindrical chamber is open both to the sand reservoir below and throughout its length to the radial compartments, into which the vapours from the hot sand below ascend gradually, become condensed, and fall, to be again vapourised and reascend. The apparatus is thus made to offer a large amount of heating surface to the surrounding air.

Isaac Brookes and William Lutwyche Jones (Manufacturers), respectively of Warwick and Birmingham. 1852. No. 14,032.

Improvements in Stoves.

The stove is quadrangular, but may be of a cylindrical or columnar form, and is constructed so that the hot air and gaseous vapours of combustion may be made to proceed at pleasure, directly to the exit flue or chimney, or along a series of ascending and descending flues, so as to determine the amount of heat radiated by the stove. The fire-chamber and fuel are contained within the body of the stove, which rests upon a base or platform, and is surmounted by a chamber for the products of combustion, both of dimensions suitable to the external design. The fire-chamber is surrounded by four hollow pillars or flues, opening respectively into the base below and the chamber above. These pillars are not concealed, but constitute an important feature of the external design, which is simple and in good taste. The lower compartment or base contains the ash-pit, which, being central, divides the base into three compartments, the hollow pillars or flues opening respectively two into each compartment on either side of the ash-pit, which is provided with a door and register in front, for a regulated supply of air. The upper chamber, which contains the products of combustion, is parted off into two compartments, but in a direction transverse to that of the compartments below. From out of the furthest of the two compartments the exit flue leads into the chimney. In the partition opposite to the exit flue is an opening or damper; when this is open, the heated air, &c., escapes direct into the flue, and so into the chimney; when closed, it is compelled to traverse the four columns successively before escaping; when partly open, a portion of the air makes its way direct into the chimney, and part into the columns. The amount of heated air in circulation and consequently the radiating action of the stove is thus brought under power of control. A vessel of water may be placed upon the top of the stove under the raised cover, to mingle a degree of humidity with the hot air brought in contact with the heated metal.

Huxley, Huxley, and Oliver's Specification (Stove-makers), Dean-street. 1838. No. 7791.

Self-regulating Apparatus for Stoves.

For opening or closing the door of the air-valve or passage of any stove, according to the degree of heat communicated to it, and consists of a tube, which is closed with a metal cap at one end, with a screw valve passing through it, and open-mouthed at the other, inverted within a tube about one-fourth filled with mercury, or oil, or other fluid. When required for use, the screw valve is opened to admit air into the inverted tube, which sinks to the bottom of the fluid, when the valve is again screwed close. As the temperature increases, the air confined within the inverted tube surrounded by the mercury becomes expanded, and, by its expansive force, lifts the tube more or less, according to the degree of heat communicated to it. The apparatus is placed in front of the stove, and, in connexion with a lever or connecting-rod, is made to open or close a valve or passage with the greatest nicety.

William Cook, King-street, Golden-square. 1845. No. 10,795.

Improvements in Stoves.

For regulating the admission of air to the stove for the purposes of combustion, and at the same time preventing the improper admission of air through the ash-pit door, by connecting the fire door with the ash-pit door, so that the closing of the one effects the closing of the other, whichever may be opened. This is effected by a compound bar made of iron and brass, and thicker at one end than at the other. The brass expands more than the iron under the influence of heat; consequently the bars recede from each other, and become bowed in the centre. The compound bar is placed in connexion with the two doors by some suitable adjustment, and regulates the opening and closing of the valves, according to the contraction and expansion of the two metals.

Hot Air Stoves (Various Constructions).

Improved Stove.

Is designed to produce a ventilation of the air in the apartment, and to prevent the deterioration complained of in the air of rooms heated by stoves.

Within the cylindrical casing of the stove, and towards one side of it, a hollow tube or cylinder extending the whole length of the stove is inserted at each end into the upper and lower horizontal plates of the casing, the orifice of the cylinder at either end being open. The fire-chamber rests upon a grating which is raised a little above the bottom plate of the stove, and is of the same area with it; at some distance above, in the outer casing, is placed the fire door for the supply of fuel, and underneath the fire grating is the ash-pit, provided with a door and regulator for the admission of small quantities of air. The smoke, gases, &c., which rise from the fire-chamber ascend to the top of the stove, and are finally carried out by the exit flue at the back, which is situated on the same side as the cylinder, the narrow annular passage behind the cylinder serving to conduct the products of combustion into the mouth of the flue. By this method of construction, a continuous current of warm air is supplied up through the cylinder into the room.

Frederick Brown, Luton, Bedford (Ironmonger). 1841. No. 9,103.

Improved Stove.

Is a cylindrical stove provided with an internal fire-chamber, the base of which is an open grating. By means of a ventilator in the upper part of the stove, regulated at will, a downward current is supplied through the fire, which carries with it the products of combustion, the residue passing up and away through one of the divisions of an exit flue into the chimney. The space between the fire-chamber and the casing of the stove is supplied with air through another regulator lower down, which, after traversing that part of the stove not occupied by the fire chamber, is either passed into the apartment or suffered to flow through the second division of the exit flue into the chimney. The stove is constructed to burn anthracite or coke, and is supplied with fuel from the top on removing the cover, in which is inserted a piece of talc.

William Pope, Edgeware-road (Ironmonger). 1842. No. 9,540.

Improved Stove.

Is a cylindrical close metal stove, designed to give out currents of heated air supplied with moisture, and free from any deleterious matter. This is effected by an arrangement of tubes placed at intervals within the circumference of the cylindrical body of the stove, extending from the horizontal plates which form the top and base of the stove. The orifices of the tubes are open, both above and below, and are carefully fitted to the plates in which they are inserted. In the central body of the stove, within the circular arrangement of pipes, is a box which serves as an ash-pit and air-feeder to the fire, which rests upon a grating above, and is supplied with a regulated amount of air from a door in front of the stove. The fire is inclosed within a chamber, open on one side towards the top by a small iron grating, and is fed from a funnel-shaped hopper, extending from the top of the chamber to the upper horizontal plate of the stove. The products of combustion are carried away through an exit flue, near the top of the stove, and situated on the side opposite to the fire-grating, into the chimney, and are thus entirely removed. By this arrangement the series of open pipes supply a continuous stream of heated air into the apartment. Some provision for its hygrometric state is contrived by an annular surface of water exposed on the top horizontal plate, and conducting threads leading from it into the tubes to mingle a degree of humidity with the continually ascending currents of air. The top plate of the stove is fitted with an ornamental dome-shaped cover, through the open work of which the hot air makes its escape into the apartment.

Joseph Cundy, 21, Victoria-grove, Kensington. 1852. No. 465.

Improvements in Stoves.

The stove is composed of fire-brick or clay, and the use of metal is avoided in those parts with which the air to be heated comes in contact. The fire is situated near the bottom of the stove, upon a grating over the ash-pit; it is inclosed within a chamber of fire-brick, in front of which is the fire door; the exit flue for withdrawing the products of combustion, is placed a little above the fire, and considerably below the top of the hot-air chamber, which closes over and around the fire-box, and occupies great part of the body of the stove. Between the hot-air chamber and the external walls and top of the stove, which are of fire-brick, is an air space, supplied from out of doors with cold external air, which becomes heated in part by its contiguity to the hot-air chamber, and in part by the direct ingress into it of heated air through the hollow bricks of which the hot-air chamber is built. The air thus heated rises up through a flue or shaft, to be conducted wherever it may be required. The stove may also be employed for causing the circulation of hot water, as well as heated air, by vessels of water supplied from above, and placed underneath the stove, in connexion with pipes up through the fire-brick, to be used together as one circulating main, or singly as separate circulating mains. This stove is scarcely applicable to ordinary dwelling-houses.

JOHN, ROBERT, and JAMES MUSGROVE, Belfast, Ireland. 1858. No. 2,652.

Improvements in Hot Air Stoves.

Have reference to what are called slow combustion stoves for heating rooms, and maintaining an uniform temperature during any length of time, and requiring to be fed not oftener than once in 60 hours. The body of the stove is quadrangular, and inclosed in a casing of cast iron, within an outer casing overlaid with encaustic tiles. It rises from a hollow base or platform, supported on feet above the floor, and serving as an air-chamber to the fire, which is maintained above in a fire-box and rests upon a grating in the top of the air-chamber or base. A strong metal plate passes up nearly to the top of the stove from the back of the fire-place, and the products of combustion are made to pass up on one side and down on the other into an exit flue at the back.

The supply of air to the chamber below enters through a door, with adjustments, for the most careful regulation of the amount supplied. Between the heated body of the stove and the ornamental casing a supply of fresh air is introduced through openings at the back and sides, with which to temper the warm air discharged through apertures in the tile work in front, into the apartment, the only air admitted to the interior of the stove being that which is allowed to pass through the body of the fire. Fuel is supplied in large quantities through a sliding door in the top of the stove, and facilities are afforded for readily extinguishing the fire, either by drawing out the grating on which it rests, or by shutting off the supply of air. The stove is chiefly suitable to large apartments.

GEORGE ERHARD HALD, Manchester (Merchant.) 1856. No. 66.

Improved Stove.

Is a close cylindrical stove standing on a quadrangular base. The fire-chamber inclosed in fire-brick is contained within the base, and is supplied with fuel through a door in front; a spiral circular flue of fire-brick ascends nearly to the top of the stove, and opens above into the chimney flue. The outer casing of the stove is of perforated metal, through which the heated air between the fire-brick flue and the casing passes into the apartment. The top of the flue is covered with a moveable cap. For the purpose of cleaning the flue when required, a ball of cast iron is introduced at the top and suffered to roll down, which operation repeated several times, effects the entire removal of all impurities. The object of this mode of construction is the obtaining a large amount of heating surface within the limits of an ordinary sized stove.

THOMAS WALKER, Birmingham (Stove Manufacturer). 1842. No. 9,440.

Improvements in Stoves.

Is a cylindrical stove, resting upon an octagon base; the central part extending perpendicularly from the top of the stove to the fire dish, which contains the fire, is occupied by a funnel-shaped feeding trunk, rendered air-tight above by a lid fitting in a ring of sand; the fuel gradually descends according to the wants of the fire below, and only ignites when received in the fire dish, the bottom of which is an open grating placed above an ash drawer within the octagon base, and through which air is supplied to the fire resting on the grating above. The stove is inclosed in two casings or cylinders, the one within the other; the smoke and products of combustion ascend into the space between the cylinders, and descend into the exit flue at the back. A passage is provided for the ingress of cold air into the space between the cylinders, and also a passage for it when heated into the apartment. The stove is closed, but the door before the fire is glazed with talc.

APPARATUS FOR HEATING ROOMS AND BUILDINGS. 1815 to 1858.

MARQUIS DE CHABANNES. 1815. No. 3,875.

For extracting more Heat from Fuel.

By the surrounding either wholly or in part an open or closed fireplace with hollow pipes, so that the heat and smoke shall be made to act on a large surface. The receiver for containing the fuel is placed above the fire, that the fuel may undergo a process of distillation before using. If placed in a lower room, sets of pipes in connexion with the main flue may be introduced into any other apartment requiring to be warmed. The amount and intensity of the heated air conveyed through the pipes is under regulation by means of valves, dampers, &c.

RICHARD TREVITHICK, Cornwall (Engineer). 1831. No. 6,083.

Improved Apparatus for Heating Apartments.

The fire is situated in the centre of a metallic vessel, capable of containing a considerable quantity of water, which surrounds the fire receptacle, except at the doorway and at an opening provided for the escape of the smoke into the chimney. The vessel is made steam-tight, and when the water boils, the door over the fire is tightly closed, to shut off the supply of air; the smoke flue is then removed, and the machine wheeled into the place or room requiring to be warmed, where it will continue to give out heat for several hours without any of the disagreeable effluvia arising from stoves heated by an inclosed fire.

JOHN LITTLE, Glasgow. 1855. No. 2819.

Improvements in Heating Apparatus.

Consists of a cylindrical external chamber, underneath which is a fire grate and fuel chamber, as in ordinary stoves. The heated air, flame, &c., pass directly into the external chamber, which is fitted with a discharge pipe and damper. Within the external chamber is an inner chamber or hot air space, fitted above with a hot air discharge pipe into the room, and below with a supply pipe for external air; a strong current is thus kept up through the hot air closet, adjustable at pleasure by a valve in the hot air discharge pipe. This arrangement is intended for warming rooms, but may be applied to a portable cooking apparatus, and may be made to derive its heat from being placed upon an open kitchen or other fire-grate.

ROBERT HAGARD, Thanet Place, Strand. 1856. No. 943.

Utilising the Waste Heat of Furnaces, Stoves, &c.

By sets of pipes, their size and number dependent upon the size of the furnace, and the room or space to be heated. The pipes, which turn upon sockets, are secured to metal plates at either end, and are inclosed in a brick chamber near the furnace or stove; into this chamber external air is conducted from underneath, to become heated by contact with the surface of the pipes, and to be passed off into the apartment requiring to be warmed.

VASE STOVES.

JAMES BURNS, Glasgow (Builder). 1799. No. 2,358.

Improvements in Fireplaces, &c., for increasing Heat, promoting Cleanliness, and the Prevention of Accidental Fire.

The fireplace is in the form of an open vase or urn, in which the fire is contained, as in an ordinary grate. The vase, which is supported upon a pedestal and plinth, stands within the chimney-place, and is supplied by a pipe underneath the floor with external air, which is directed into the fire through the open grating of bars on which the fire rests; the dust, ashes, &c., fall through the grating, and pass down the pedestal of the vase into the drawer of the ash-pit, enclosed within the plinth or base of the urn. The smoke and products of combustion arising from the fire pass up the chimney in the ordinary way. The back of the chimney-place is circular, and from each side is made to draw out a framework, fitted with glass or wire gauze, in front of the stove, to inclose the fire, and serve as a screen for the prevention of accidental fire.

ALLAN POLLOCK, Paisley (Merchant). 1807. No. 3,049.

Stove of a New Construction.

Consists of a cubical stove, upon which stands an ornamental vase or urn. The fire is situated within the stove, and to prevent the metal casing from becoming overheated is inclosed in a chamber of fire-brick. By means of a circuitous passage, and various suitable subsidiary arrangements, the heated air within the stove is conducted into the vase on the top, and from thence distributed into the apartment. The products of combustion are passed away through a tube leading into the chimney from the stove below.

A Portable Stove, by which a Current of Air is heated and discharged, so as to produce Ventilation as well as Warmth.

The stove is small and portable, and is dome or bell shaped. The fire burns within a grate of ordinary construction, above a platform or pedestal, in which is an ash drawer, with registers for the admission of air. The grate is covered over by a dome resting on the platform, and by a second and larger dome, which forms the external casing. The smoke, &c. is passed away by an exit pipe leading from the grate into the chimney at the back, or elsewhere; the heated air inclosed between the casings of the outer and inner domes is passed upwards through a small tube or neck, on the summit of the outer dome into the apartment. The fire in front is open to the air-space between the two casings, and in the base of the outer dome apertures are provided, for the supply of air for combustion, and to allow, if required, a view of the fire within. Fresh external air may be supplied into the air space if desired, so as to ensure a distribution of warm pure air into the apartment.

Appendix.

William Clark, Esq. 1810. No. 3,331.

For the Prevention of Smoke, Dust, and Accidental Fire.

The grate containing the fuel is covered in on all sides, but that which faces the apartment with plates of metal, and is provided with a pipe to carry off the smoke into the chimney; the front, which is open to the room, is carefully fitted with a screen of ornamental wire-work or glass. For combustion, air is supplied into the fire through a pipe communicating with some external source, or by apertures in the sides of the stove, the supply in both cases being regulated by a valve or crank. This method of construction is applicable to any other form of grate, or to a stove situated in the centre of a room.

William Burge, Bristol. 1813. No. 3,752.

Improvements in the Construction of Fireplaces.

The fire burns within an open grate inclosed in a covered vase or urn. The current of air for its supply enters over the top, passes downward through the fire, and carries with it the smoke, &c., into the space between the grate and the circumference of the vase, which is thus made to serve as a flue or air chamber, and passes out through a pipe at the back of the urn into the chimney or niche in which the vase is situated. The ash-pan is placed below in the pedestal of the urn, and is provided with openings for the admission of air. These arrangements are applicable to vases of any form, and are designed to guard against dirt and accidental fire.

Enoch Tonkin, City Road (Stove Manufacturer). 1816. No. 3,999.

A Globular Stove for reflecting Light and Heat.

The grate is contained within a hollow globe of metal, made to open or close by sliding screens or shades, which may be either partly or wholly drawn out or pushed back; when wholly drawn out, so as to form a perfect globe, they serve to extinguish the fire, and to conceal the grate in summer; when partly drawn out they regulate the action of the fire, by increasing or diminishing the draught, according to the extent of the aperture. The back of the grate is closed, with the exception of a small grating for the escape of the gases into the chimney, the other products of combustion being destroyed by re-submitting them to the action of the fire by a downward current. The ashes, &c., pass into a drawer for their reception underneath the globe. The object of the invention is to secure additional heat by radiation, and freedom from smoke, dust, &c.

William John Roffe, Upper Holloway (Gentleman). 1855. No. 2,233.

Improvements in Stoves and Furnaces.

The fire burns within an egg-shaped grate, contained in a conical urn, and the air for its supply is derived through various perforations in the ornamental work of the casing. The exit pipe for the passage of the smoke is carried downwards along the hearth, and from thence into the chimney, the heated air from the fire alone being suffered to pass up through perforations in the cover of the vase into the apartment. The ash-pit is contained in the base of the pedestal, and the entire vase is situated within the focus of a polished concave reflector, which fills the chimney aperture, for the purpose of reflecting back the heat of the fire into the apartment. When it is desirable to exclude a view of the fire through the perforations, an inner screen is drawn forward, so as to inclose it in the direction required.

APPENDIX.

GENERAL BOARD OF HEALTH.

EXPERIMENTS to determine the Effect of Duplicate Panes of Glass.

THE Board room is glazed with 240 square feet of glass inserted in five sashes, and the loss of heat, owing to this large cooling surface, amounts to upwards of 300 cubic feet of air, reduced from the temperature of the room to that of the external temperature, per minute; in point of fact, no part of the air of the room is so reduced, but a very much larger quantity is cooled to a less extent, the above being the amount of heat actually lost per minute. If the difference of the two temperatures be 20 degrees, then in every minute 300 cubic feet will be cooled 20 degrees, or 6,000 cubic feet, at the rate of 1 degree per minute, or an intermediate quantity to an intermediate amount.

To ascertain the effect of inserting duplicate panes of glass, the following experiments were made in the President's, the Secretary's, and the Board rooms. The President's room was glazed with duplicate panes and sashes, with an interval of 1 foot between the two; the Secretary's room was glazed under the direction of the Commission by Mr. Bridges Adams, according to his patent for inserting a second pane in the same sash, the space between the two being two-eighths of an inch; and the Board room was glazed with single panes only. In each of these rooms delicate thermometers were placed, one outside and one inside, with their bulbs in contact with the glass, and a third in contact with the shutter near the windows.

EXPERIMENTS to determine the Effects of Single and Duplicate Panes of Glass in different Rooms.

NAME of ROOM.	Whether Single or Double Pane, with Distance of Separation.	Year, Month, Day, and Hour.	READING OF THERMOMETERS PLACED					
			In Contact with Glass,		In Contact with Shutter Inside.	Inside of Glass lower than Shutter Inside.	Inside of Glass, higher than Outside.	On Shutter, higher than Outside of Glass.
			Outside.	Inside.				
		1857:	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Board Room - -	Single pane - -	Feb. 2 - 10.10 a.m.	35·1	36·4	38·4	2·0	1·3	3·3
		11.15 a.m.	38·8	40·0	40·9	0·9	1·2	2·1
		1.10 p.m.	39·3	41·3	43·2	1·9	2·0	3·9
		3.15 p.m.	37·8	40·3	44·8	4·5	2·5	7·0
Mr. Butler's Room -	Duplicate pane separated ⅜ inch.	Feb. 2 - 10.30 a.m.	35·8	38·7	40·0	1·3	2·9	4·2
		11.30 a.m.	38·2	42·1	42·1	0·0	3·9	3·9
		1.20 p.m.	38·4	43·6	44·7	1·1	5·2	6·3
		3.35 p.m.	36·8	44·1	46·9	2·8	7·3	10·1
Board Room - -	Single pane - -	Feb. 3 - 10.5 a.m.	30·6	34·2	40·7	6·5	3·6	10·1
		3.10 p.m.	31·8	35·7	42·8	7·1	3·9	11·0
Mr. Butler's Room -	Duplicate pane separated ⅜ inch.	Feb. 3 - 10.20 a.m.	31·1	37·8	42·1	4·3	6·7	11·0
		0.45 p.m.	32·8	39·3	42·8	3·5	6.5	10·0
		3.10 p.m.	32·0	42·2	46·7	4·5	10·2	14·7
Board Room - -	Single pane - -	Feb. 4 - 10.25 a.m.	31·2	35·1	39·1	4·0	3·9	7·9
		11.50 a.m.	33·0	36·7	41·9	5·2	3·7	8·9
		2.35 p.m.	34·1	37·8	42·9	5·1	3·7	8·8
Mr. Butler's Room -	Duplicate pane separated ⅜ inch.	Feb. 4 - 10.20 a.m.	30·4	37·8	42·7	4·9	7·4	12·3
		11.50 a.m.	32·7	41·1	45·0	3·9	8·4	12·3
		2.35 p.m.	35·5	43·7	46·8	3·1	8·2	11·3
President's Room -	Duplicate pane separated 1 foot.	Feb. 4 - 11.50 a.m.	33·5	48·7	53·6	4·9	15·2	20·1
		2.35 p.m.	35·7	48·3	50·8	2·5	12·6	15·1
Board Room - -	Single pane - -	Feb. 5 - 10.10 a.m.	35·1	37·0	39·7	2·7	1·9	4·6
		0.45 p.m.	38·0	39·8	41·6	1·8	1·8	3·6
Mr. Butler's Room -	Duplicate pane separated ⅜ inch.	Feb. 5 - 10.10 a.m.	33·7	38·7	40·9	2·2	5·0	7·2
		0.45 p.m.	36·2	40·8	42·0	1·2	4·6	5·8
President's Room -	Duplicate pane separated 1 foot.	Feb. 5 - 10.10 a.m.	34·4	47·2	51·7	4·5	12·8	17·3
		0·45 p.m.	37·2	49·7	53·8	4·1	12·5	16·6
Board Room - -	Single pane - -	Feb. 6 - 10.10 a.m.	43·6	43·8	43·6	0·2	0·2	0·0
		2.30 p.m.	47·5	47·8	46·8	1·0	0·3	0·7
Mr. Butler's Room -	Duplicate pane separated ⅜ inch.	Feb. 6 - 10.10 a.m.	43·9	44·8	44·9	0·1	0·9	1·0
		2.30 p.m.	48·5	49·1	51·7	2·6	0·6	3·2
President's Room -	Duplicate pane separated 1 foot.	Feb. 6 - 10.10 a.m.	44·7	52·0	56·8	4·8	7·3	12·1
		2.30 p.m.	48·8	55·7	59·7	4·0	6·9	10·9
Board Room - -	Single pane - -	Feb. 7 - 10.10 a.m.	44·8	45·7	47·0	1·3	0·9	2·2
		0.50 p.m.	45·7	46·6	47·3	0·7	0·9	1·6
Mr. Butler's Room -	Duplicate pane separated ⅜ inch.	Feb. 7 - 10.10 a.m.	44·3	47·7	48·9	1·2	3·4	4·6
		0.45 p.m.	45·1	50·3	52·0	1·7	5·2	6·9
President's Room -	Duplicate pane separated 1 foot.	Feb. 7 - 10.10 a.m.	44·7	52·0	56·3	4·3	7·3	11·6
		0.50 p.m.	45·0	52·9	56·5	3·6	7·9	11·5

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From these experiments we learn that with a single pane of glass, when the external temperature was about 32° on February 3d and 4th, the inside temperature was 3°·7, and at the shutter was from 8° to 11° warmer than outside the glass; that when the temperature outside was 37°, as on February 2d and 5th, the temperature inside the glass was 1°·9, and at the shutter was 4°·1 warmer; and on February 6th and 7th, when the temperature was 45° outside, that on the inside the glass was less than 1°, and at the shutter was nearly 2° warmer. On the series of observations the inside was 2°.1 higher than the outside, and the inside on the shutter was 4°·8 higher than outside the glass.

With a duplicate pane separated two-eighths of an inch, the inside was warmer than the outside by 8° on February 3d and 4th; by 4°·8 on February 2d and 5th; by 0°·8 on February 6th; and by 4°·3 on February 7th. Upon the series of experiments the inside was 5°·4 higher than the outside, and at the shutter was 7°·8 higher than the outside of glass.

With duplicate sashes, separated one foot, the inside of the glass was higher in temperature than the outside by 13° on February 4th and 5th; and by 7° on February 6th and 7th; at the shutter was 17° on the first two days, and 11½ on the last two.

On the four days' experiments the inside was 10°·3 warmer than the outside, and at the shutter was 14°·4 warmer than the temperature outside the glass.

The above experiments are too few in number to give other than suggestive results. A parallel series of experiments was therefore carried on by John Lee, Esq., L.L.D., of Hartwell House, near Aylesbury, with instruments made by Negretti and Zambra, similar in all respects to those used at the Board of Health.

At Hartwell House experiments were made on every day, from February 19th to April 15th, 1857, in the library, the windows of which were glazed with single panes, and in the drawing-room and billiard-room, the windows of which were glazed with duplicate panes and sashes separated five inches from each other. From this series of experiments the following results were obtained:—

HARTWELL HOUSE—(LIBRARY).

RESULTS of Experiments with a Single Pane of Glass.

—	MEAN READING OF THERMOMETER PLACED					
	In Contact with Glass separated 5 inches.		In Contact with Wall Inside.	Inside of Glass lower than Wall of Room.	Inside higher than Outside of Glass.	Higher in Room than External Air.
	Outside.	Inside.				
1857:	*Deg*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
February 19 to 28 - - -	43·8	46·4	48·8	— 2·4	2·6	3·5
March 1 to 11 - - - -	41·4	43·8	46·4	— 2·6	2·4	3·5
March 15 to 24 - - -	43·5	45·8	47·3	— 1·5	2·3	1·7
March 25 to April 5 - - -	49·3	50·4	49·8	+ 0·6	1·1	— 1·2
MEAN - - -	44·5	46·6	48·1	— 1·5	2·1	1·9

It thus appears that the temperature of the outside of the glass differed very little from the temperature of the air; but that when the temperature of the air rapidly increased, as on February 28th and March 5th, the temperature of the glass was four degrees below that of the air; and that when, on the contrary, the temperature of the air quickly decreased, as on March 10th, the temperature of the glass was two degrees higher than that of the air.

The temperature of the inside of the glass was generally cooler than that of the walls of the room. When the external temperature was very cold, as on March 10th, the temperature of the wall was 12 degrees higher than that of the glass; but when the external temperature was very warm, the temperature of the glass exceeded that of the wall by five degrees, as on April 5th. Upon the series of observations, the temperature of the wall was higher than that of the glass to the mean amount of 1°·5.

The inside of the glass was higher than that of the outside to the mean amount of 2°·1.

The temperature of the wall inside was higher than the temperature of the air to the mean amount of 1°·9.

HARTWELL HOUSE—(Drawing-room).

Results of Experiments with Duplicate Panes of Glass separated 5 inches.

PERIOD of OBSERVATION.	Mean Reading of the Thermometers placed					
	In Contact with Glass separated 5 inches.		In Contact with Wall Inside.	Inside of Glass lower than Wall of Room.	Inside higher than Outside of Glass.	Higher in Room than External Air.
	Outside.	Inside.				
1857:	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg*
February 19 to 28 - - -	44·7	56·5	58·7	— 2·3	11·8	13·4
March 1 to 11 - - -	42·9	55·4	59·7	— 4·3	12·5	16·8
„ 15 to 24 - - -	45·4	57·9	59·9	— 2·0	12·5	14·3
„ 25 to April 5 - -	50·7	60·9	61·4	— 0·5	10·2	10·4
Mean - - -	45·9	57·6	59·9	— 2·3	11·7	13·7

It therefore appears that the temperature of the outside of the glass differed but about 1 degree from the temperature of the air; but there are instances when the temperature of the air is shown to have rapidly increased, when that of the glass did not; on these occasions, as on March 26th, the temperature of the glass was 6 degrees lower than that of the air. On the contrary, when the temperature of the outside glass increased, and that of the air did not, the temperature of the glass exceeded that of the air by 5 degrees, as on April 3d. Upon the series of observations the temperature of the air was 0°·2 higher than that of the glass. The temperature of the inside of the glass was usually a little cooler than that of the walls; but when the external temperature was very cold, as on March 10th, the temperature of the wall was higher than that of the glass by 7 degrees. And, on the contrary, when the external temperature was very warm, the temperature of the glass was higher than that of the wall by 5 degrees, as on April 5th. Upon the series of observations the temperature of the wall was a mean amount of 0°·4 lower than that of the glass. The temperature of the inside of the glass was higher than that of the outside to the mean amount of 12 degrees.

HARTWELL HOUSE—(Billiard-room).

Results of Experiments with Duplicate Panes of Glass, separated 5 inches.

PERIOD of EXPERIMENTS.	Mean Reading of Thermometers placed					
	In Contact with Glass separated 5 inches.		In Contact with Wall Inside.	Inside of Glass lower than Wall of Room.	Inside higher than Outside of Glass.	Higher in Room than External Air.
	Outside.	Inside.				
1857:	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
February 19 to 28 - - -	46·1	57·3	57·6	— 0·8	11·2	12·3
March 1 to 11 - - -	43·9	56·7	56·7	0·0	13·7	13·8
„ 15 to 24 - - -	43·8	57·0	56·8	+ 0·2	13·2	11·2
„ 25 to April 5 - -	51·2	51·1	59·3	+ 1·9	9·9	8·3
Mean - - -	46·0	58·0	57·6	+ 0·4	12·0	11·4

On examining these observations, it is evident that the temperature of the outside of the glass, on an average differed about one degree from the temperature of the air. But there are instances when the temperature of the air rapidly increased, and that of the glass did not, as on 22d February, and 26th March, when the temperature of the air exceeded that of the glass by four degrees. When the temperature of the air decreased to a low point, that of the glass exceeded the air by three degrees, as on 10th March. Upon the series of observations the temperature of the air was 0°·3 higher than that of the glass.

The

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The temperature of the inside of the glass was usually three degrees lower than that of the wall of the room; but when the temperature of the inside of the glass was little different from the outside, the temperature of the wall was higher than that of the inside of the glass by nine degrees, as on 4th March; and when the temperature of the wall was nearly the same as that of the air, the temperature of the inside of the glass was two degrees higher than that of the wall, as on 5th April. Upon the series of observations the temperature of the wall was a mean of 2°·3 higher than that of the glass.

The temperature of the inside of the glass was higher than that of the outside to the mean amount of 11°·7.

The temperature of the wall inside was higher than the temperature of the air to the mean amount of 13°·7.

Appendix.

Appendix.

WELLINGTON BARRACKS.

Experiments to determine the Draught of each Chimney, and the Amount of Air escaping from the Room by the Chimney, in Soldiers' Rooms, Nos. 25, 26, 27, 28, and 32.

To determine the draught of each chimney, and the amount of air escaping from each room by the chimney, the following experiments were made in soldiers' rooms Nos. 25, 26, 27, and 28.

The dimensions of each chimney were as follows:—

Room 25:

Height of chimney	5 feet.
Dimensions of chimney-pot	8½ inches by 8½ inches.
Area of chimney-pot	72·25 square inches.
Bottom of chimney	6 inches by 8 inches.

Room 26:

Height of chimney	57 feet.
Dimensions of chimney-pot	7¾ inches by 7¾ inches.
Area of chimney-pot	60·06 square inches.
Bottom of chimney, 6 feet from fire	16 inches by 9 inches.

Room 27:

Height of chimney		57 feet.
Dimensions of chimney-pot		7¾ inches by 7¾ inches.
Area of chimney-pot		60·06 square inches.
Bottom of chimney	middle	10½ inches.
	each end	9½ inches.
	length	22 inches.

Room 28:

Height of chimney	57 feet.
Dimensions of chimney-pot	8½ inches by 8½ inches.
Area of chimney-pot	72·25 square inches.
Bottom of chimney	6 inches square.

The temperature of each chimney was determined, to calculate the height of a column of air of corresponding temperature, which would balance a column of external air the height of the chimney, the draft of the chimney having been considered equal to the velocity which a heavy body would acquire in falling through the difference of height of these two columns.

Another method adopted was by the use of a delicate anemometer, which at once indicated the velocity of the air issuing from the chimney, when held a few inches down the chimney-pot.

The number of cubic feet of air discharged per minute was found by dividing the product of the velocity, as determined by either method into the area of the chimney-pot by 144.

Room 25: Not a good fire.

By anemometer 1,960 lineal feet issued per minute, consequently 983 cubic feet of air escaped per minute.

Temperature of external air was	46°
Reading of thermometer with bulb at throttle valve was	116°
In chimney at ventilator	100°
Top of chimney	87°

From this data 63½ feet of air in the chimney balanced 57 feet at external temperature, and the air escaped with a velocity of 1,224 feet per minute; or in volume, 614 cubic feet of air escaped per minute.

With a good fire:—

Temperature near bottom of chimney was	144°
„ 12 feet high was	120°
„ near top of chimney was	100°

Therefore a column of hot air 65 feet in height balanced one of cold of 57 feet; it escaped a the rate of 1,380 feet per minute; that is 700 cubic feet issued per minute.

Room 26.—Ordnance Stove:

Temperature of external air was	46°
„ of chimney at top was	89°
„ 12 feet high was	90°
„ of chimney at bottom was	80°

From this data, 61¾ feet of hot air balanced one of cold air of 57 feet in height; and air issued at the velocity of 1,027 feet per minute, or in volume 428 cubic feet per minute.

On the first application of fuel the temperature at the top of the chimney rose to 105°.

By the anemometer the velocity of escape was 2,604 feet per minute, or in volume 1,051 cubic feet.

Room 27.—Lee Stevens' Stove:

Temperature of external air was	47°
„ of chimney at top was	88°
„ of chimney at bottom was	82°

From this data, 61·4 feet of hot air balanced 57 feet of cold, and the rate of escape was 1,027 feet per minute, or in volume 564 cubic feet per minute.

By anemometer the rate of escape was 2,675 feet per minute, or in volume 1,116 feet per minute.

Room 28.—Edwards' Arnott's Stove:

Temperature of the external air was	48°
„ at top of the chimney was	75°
„ at the ventilator was	87°
„ at bottom of the chimney was	124°

From these data, 62·4 feet of hot air balanced 57 feet of cold, and the air escaped at the rate of 1,123 feet per minute, or of 564 cubic feet in volume.

By the anemometer the velocity was 1,200 feet, or 602 cubic feet per minute.

In Room 32 the temperature of the bottom of the chimney was 115°, and at the top was not determined.

In a chimney on the same stack, number not known, the fire was smoking, and the temperature at the top was 108°. If this were the chimney of Room 32, the air would be shown to have been escaping at the rate of 565 cubic feet per minute.

In Room 27, without a fire:

The temperature of external air was	46°
„ at bottom of chimney was	47°
„ at top of chimney was	51°

From the above data less than 40 cubic feet of air was escaping by the chimney per minute at this time.

During all these experiments the rate of the motion of the air was continually changing; and the discordance of the results obtained by the two methods shows that both are very imperfect.

On the Ventilation of Barracks.

The ventilation of barracks is very imperfect, not from any fault in construction, but from the number of men congregated and sleeping within necessarily limited spaces; and that the science or art of ventilation of buildings has never been reduced to system.

Openings are made from the open air outside the building, below, for the admission of fresh air, and above for the escape of the foul, in various fanciful ways; but although the cold draughts are so inconvenient that every endeavour is practised to obstruct the inlet, the circulation is so sluggish, that a regulation has been established, under medical opinion, that every barrack-room in England should contain 500 cubic feet of air, and in hot countries 600, per man, manifestly, as I conceive, as a remedy for imperfect ventilation; and notwithstanding that regulation, and the measures taken for establishing a circulation, the air in a barrack-room that has its complement of men is generally in an unsatisfactory state, which is particularly experienced after they have been some hours in bed.

I am very much inclined to believe that an efficient and wholesome circulation of air, and one not attended with discomfort, can only be obtained for barracks by some artificial power, either for the forcing in of fresh air or the drawing out of the foul.

The desideratum for barracks is not only to obtain that sufficient and wholesome renewal of air, but to combine with it, in the greatest possible degree, economy of space; thus, if, by a good system, two-thirds of the present regulated space per man should be found to be sufficient, every barrack might contain one-third more soldiers.

Another consideration of importance for the convenience of the men and of the service would be, even with a fixed amount of cubical space per man, to reduce the height of the rooms as much as a proper degree of ventilation will allow, so as to obtain the greatest surface of floor for the accommodation of the troops. It will be, therefore, very useful to define, under what may be found the best mode of ventilation, the minimum of cubical space per man that is to be admitted, and the minimum height that can be allowed for the rooms.

War Department, Pall-mall,
20 November 1856.

J. F. Burgoyne.

REPORT

REPORT on the CHEMICAL RELATIONS of VENTILATION.

By *Henry E. Roscoe*, B.A., PH. D.—May 1857.

Appendix.

THE atmosphere of a closed inhabited space becomes unfit for continued respiration long before the whole of the oxygen which it contains is consumed. The presence of very small quantities of the products of combustion render the air unhealthy, although almost the normal amount of oxygen remains. Hence it is by the quantity of impurities introduced into the air, and not by a diminution in the proportion of the active constituent, that we are best able to judge of the capability of such an atmosphere to support animal life.

These conditions of deterioration which render the supply of fresh air necessary to living animals inhabiting closed spaces are :—

1. The presence of an excessive quantity of carbonic acid and carbonic oxide, arising from the combustion of carbon; and also the presence of other poisonous gases.

2. The presence of either too large or too small a quantity of aqueous vapour dissolved in the air.

3. The presence of organic putrescent bodies, or effluvia, proceeding from decomposing animal or vegetable matter.

4. Inconvenient elevation of temperature arising from the heat of combustion.

The existence of any one of these four sources of deterioration in the air in which animals dwell for any length of time is injurious to the health of such animals. In general, however, these four conditions of impurity occur together, and an efficient system of ventilation must therefore,—first, free the air from excess of the products of oxidation of carbon; secondly, adjust the proper equilibrium between the air and the dissolved aqueous vapour; thirdly, carry off completely all putrescent organic matter disseminated through the air; and fourthly, establish an agreeable mean temperature.

First, as regards the presence of the gases produced by the oxidation of carbon, viz., carbonic acid and carbonic oxide.

Carbonic acid and carbonic oxide act as poisons upon the animal organism. Both produce asphyxia when inhaled in large quantities; but the quantity of carbonic oxide which renders an atmosphere unfit for the support of life is much smaller than is the case with carbonic acid.

Air containing one per cent. of carbonic oxide is immediately fatal to animal life, whilst with a per-centage of from four to five parts of carbonic acid respiration can be continued, though with difficulty; and life can be supported for a few moments in an atmosphere containing 30 per cent. of this gas (Leblanc).

Both carbonic oxide and carbonic acid occur in unconfined air in varying proportions. A mere trace of the former gas is found in normal air, but the quantity of carbonic acid is more considerable, varying from three to six, and even nine parts by volume in 10,000 parts of air. In thickly populated districts, towns, &c., where the products of combustion are evolved in proportionally large quantities, the per-centage of carbonic acid is in general larger than in the open country. Various causes, such as fall of rain, or wind, may however reduce the amount of carbonic acid contained in the atmosphere of large towns to the minimum quantity. (*See* Experiment III.)

As a general average of all the most accurate experiments, we may assume that normal air contains four parts of carbonic acid in 10,000 parts (by volume) of oxygen and nitrogen.

The combustion of fuel and the respiration of animals are the two sources of the increased amount of the oxides of carbon found in inhabited spaces.

Carbonic oxide is solely produced by the imperfect combustion of carbon, and hence the only source of an increased quantity of this gas is found in fuel burning with an insufficient supply of oxygen. If, as is almost always the case, in our country at least, the products of the combustion of the heating materials are completely removed by chimneys or flues, the presence of any large amount of carbonic oxide in the inhabited space need not be feared. The poisonous effects produced on respiration in closed spaces heated by stoves without flues are chiefly due to the presence of carbonic oxide; and these modes of warming closed dwelling rooms cannot be too strongly condemned.

Carbonic acid, on the other hand, is produced by the complete combustion of carbon, and the increased amount of this gas in inhabited spaces is to be attributed to the combustion of the fuel, and the hydro-carbons used for illuminating purposes, but chiefly to the respiration of animals. Assuming, then, that the ordinary chimneys carry off all the carbonic oxide and carbonic acid formed by the combustion of the fuel, we have to consider how we can best diminish the quantity of carbonic acid produced in a closed space by the respiration of animals, and by the combustion of illuminating bodies.

In order to be able to determine this point, we must know—

1. How much carbonic acid is produced by the animals inhabiting the spaces under consideration, and how much by the combustion of oil, gas, or other illuminating substances.

2. How small a quantity of carbonic acid will affect the health of the animals living in the enclosed atmosphere.

In order to determine the first of these questions, it will be sufficient to ascertain from the best experimental data, the quantity of carbonic acid exhaled by an adult man in a given time, as it is with men alone that we are in this instance concerned.

The researches of various Physiologists, particularly of Lehmann, Vierordt, and Scharling, have shown that the quantity of carbonic acid expired by human beings varies considerably with the age, sex, and state of body of the individual, and that it is also somewhat dependent upon other conditions, such as temperature, atmospheric pressure, hygrometric state of the air, &c. The difference, between the quantity of carbonic acid exhaled by a waking and a sleeping man, was found by Scharling to be very considerable, nearly one-third less being given off in the sleeping than in the waking state.

The best direct determinations of the quantity of carbonic acid exhaled by a man in a state of rest are those of Scharling. He estimated the carbonic acid evolved by various individuals placed in an inclosed volume of air, allowing the respiration to proceed in a perfectly natural manner, and the experiment to continue for several hours.

The following is a Table of his chief results:—

	Age.	Weight of the Body in lbs. Avoirdupois.	Carbonic Acid evolved per Hour in Grains.	Carbonic Acid for every lb. of Body.
Man - - - - - - -	35	144·41	518·78	3·58 grains.
Youth - - - - - - -	16	127·21	529·35	4·12 „
Soldier - - - - - - -	28	180·80	565·50	3·13 „

The mean of these three determinations gives 537·5 grains (or 34·81 grammes) of carbonic acid exhaled per head per hour; this corresponds to a volume of the gas (reduced to 0° C and the normal pressure) of 17·52 litres, or 1069·2 cubic inches.

A second and indirect method of obtaining the quantity of exhaled carbonic acid is to determine:—1. The average volume of the air expelled from the lungs at each respiration. 2. The number of respirations per hour. And 3. The percentage amount of carbonic acid contained in the expired air.

According to the best experiments, the volume of air expired by an ordinary breath is 500 cubic centimetres, 30·51 cubic inches (Vierordt); the number of respirations to be 16 per minute (Huchinson); and the quantity of carbonic acid contained in the expired air to be 4·6 per cent. (Brunner and Vierordt). Hence the volume of carbonic acid expired per hour amounts to 22·08 litres, or 1,348 cubic inches. This quantity is somewhat larger than that found directly by Scharling, and we may take the mean of these two numbers, 19·8 litres, 1,208 cubic inches, as the highest average of the amount of carbonic acid expired by an adult man per hour.

We have next to determine the quantity of carbonic acid evolved from bodies used for illuminating purposes. The average quality of coal-gas gives on burning from 80 to 90 per cent. of its volume of carbonic acid. Wax, oil, and tallow produce on combustion about 200 per cent. of their weight of carbonic acid, or by burning 2 lbs. of stearine in 1,800 cubic feet of air, the quantity of carbonic acid formed will amount to 4 per cent. of the total volume, or the air will have become as impure as if it had all passed through the lungs.

The solution of the second question proposed, viz.: how small an admixture of carbonic acid will render an atmosphere unhealthy, cannot be so satisfactorily obtained.

All direct experimental data upon which a conclusion can be based are here wanting, and the amounts of carbonic acid stated by several authorities upon various grounds to be injurious to health are so different, that it is difficult to come to any definite conclusion regarding this point.

It is, however, generally admitted that air containing more than one per cent. of carbonic acid is injurious, and that air containing ½ per cent. is hurtful if breathed for any length of time (Leblanc and Peclét). Numerous authorities assert that a far greater dilution of the carbonic acid is necessary to ensure health (Arnott and Reed), but this statement has not been verified by direct experiment.

In the present state of our knowledge upon the subject, it is therefore premature to say that the smallest increase of carbonic acid above the normal amount is not productive of harm. Hence no exact limit can at present be fixed at which the carbonic acid becomes harmless, and the object of ventilation in this particular must be to diminish the amount of carbonic acid as much as possible below the limit admitted to be hurtful, without incurring other unpleasant effects arising from draughts of air, or reduction of temperature. It would nevertheless appear impossible by any system of ventilation to reduce the quantity of carbonic acid contained in an inhabited closed space to the proportion contained in the free atmosphere.

Every trace of other poisonous gases, such as carbonic oxide and sulphuretted hydrogen, must necessarily be immediately removed.

Having thus arrived at certain conclusions regarding the amount of carbonic acid, which must not be increased if the air is to remain innocuous, we may proceed to the consideration of the second cause of insalubrity, viz., the presence of too large or too small a quantity of aqueous vapour.

The average amount of aqueous vapour contained in the free atmosphere throughout the year is about 82 per cent. of the total amount which it can contain. Hence we may conclude that the aqueous vapour dissolved in the air of artificially heated spaces should not vary much from this amount. This theoretical conclusion is borne out by experience. In heating the House of Lords the conditions under which an agreeable atmosphere, as regards aqueous vapour, is found to exist, is when the difference between the wet and dry-bulb thermometers, at a working temperature of 64° Fah., is more than 3° Fah. and less than 9° Fah. (Goldsworthy Gurney). This corresponds to an amount of watery vapour, varying from 82 to 55 per cent. on the saturating quantity.

According to the experiments of Vierordt the quantity of water exhaled by a man per hour is about 20 grammes (309 grains). The quantity of air at 60° half saturated with aqueous vapour, which is required to take up this 20 grammes, so as to become three-fourths saturated, is about 280 cubic feet. Hence we see, that in order to effect a proper equilibrium between the air and the dissolved aqueous vapour, about 221 cubic feet of air must be given to each individual per hour, under those empirical conditions.

When the watery vapour exceeds 80 per cent. of the total possible quantity, the necessary evaporation and diffusion from the lungs and the pores of the skin is checked; and when the aqueous vapour is below 50 per cent. the exchange proceeds too rapidly, and unpleasant sensations of dryness are experienced.

Appendix.

The third cause of deterioration of an inhabited confined atmosphere, viz., the presence of organic putrescent matters, animal effluvia, is one which as yet we are unable to estimate chemically.

The air of a fever or cholera hospital, of the Pontine marshes, or the swamps of the Ganges is, chemically speaking, pure; that is, we have up to the present time failed to detect by chemical means any difference between such air and other air obtained from the most salubrious situations, and yet the physiological properties of such air are most injurious.

In all cases in which exhalations of decomposing organic matter are given off from the living animal, carbonic acid is at the same time evolved by respiration and diffusion from the surface of the body.

As no experimental data exist upon which to found any conclusion regarding the injurious nature of effluvia alone, and as, *cæteris paribus*, the quantity of carbonic acid is directly proportional to the amount of animal effluvia, in the present state of our knowledge all that we can do, in the chemical investigation of unhealthy atmospheres, is to take the carbonic acid as representing the deterioration both from respiration and from organic putrescent exhalations.

In answering the practical question, however, as to whether or not an inhabited space is well ventilated, we may assist and confirm our chemical opinion by a physiological test, and we must conclude that an atmosphere is unhealthy which affects any of our senses in an unpleasant way, either on continued habitation or occasional entrance.

The consideration of the fourth point regarding the temperature of closed spaces belongs especially to the physical branch of the subject; it is, therefore, here not discussed.

The opinions regarding the quantity of air required for the healthy continuance of respiration are, as has been stated, very various. From purely practical and experimental grounds, Peclét (*Traité de la Chaleur*) concludes that each man requires five cubic feet of air per minute. His conclusions are based, first, upon the amount of air which was practically found necessary in order to exclude all closeness and smell from schools; secondly, upon the amount of air at the mean atmospheric temperature and half saturated with aqueous vapour, which became saturated by the moisture given off from the body.

The minimum quantity of air which a man should receive per minute is, according to Vierordt, 2½ cubic feet; Dr. Reed advises 10 cubic feet per minute, and Dr. Arnott considers 20 cubic feet necessary. From my own experiments (*see* Carbonic Acid determination at Wellington Barracks, No. 1), I have come to the conclusion that 10 cubic feet per minute is insufficient to remove all effluvia and to diminish the carbonic acid to a satisfactory minimum limit, and that probably at least 20 cubic feet per minute per man is necessary to remove completely the organic putrescent matter at least in the case of soldiers' sleeping rooms.

The amount of ventilation required in a room of a given size, occupied by a given number of persons, must naturally partly depend upon the duration of the occupation, although in most cases an equilibrium between the produced and escaping carbonic acid is soon established.

The various sources from which a supply of fresh air is obtained may be divided into two classes:

1. Accidental or natural sources, or means of access of air not employed solely for the purpose of ventilation, such as chimneys, windows, walls, doors, &c.

2. Special or artificial sources, or means employed solely for the direct object of increasing the supply of air.

The present incomplete state of the whole subject of ventilation depends in great measure on the want of precise information upon two fundamental points. The first of these we have already considered, viz., When is and when is not a closed inhabited atmosphere unhealthy? To this question no definite answer can be given. The second point, upon which our knowledge is equally defective, relates to the amount of ventilation which we obtain from the accidental sources, under all possible conditions. Until we know exactly when an atmosphere is unhealthy, and can tell how much fresh air enters and deteriorated air issues from our windows, doors, and chimneys under given circumstances, we cannot expect that the subject of ventilation should assume a definite form.

The determination of the first of these defective points would involve a laborious

rious investigation in chemical physiology. The full examination of the second point would also entail an extended series of determinations, and the results would be valuable and reliable only when the experimental data had increased to a very large amount.

I have been unable to enter at all fully into this latter most important fundamental question. I have merely made one series of determinations which may serve to show the interesting facts which might be obtained from a more extended experimental inquiry.

EXPERIMENT I.

A quantity of carbonic acid was evolved in a room of 2,560 cubic feet capacity, and containing no fire and a closed flue, and all doors (four) and windows (two) were shut.

The carbonic acid contained in the inclosed air was then determined (by the method afterwards described) at consecutive half-hours.

The following are the experimental data:

TEMPERATURE of the Air = 52° Fah. Barometric Pressure = 29·7 inches.

	At $0^h\ 0^m$	At $0^h\ 30^m$	At $1^h\ 0^m$	At $1^h\ 30^m$
Weight of Carbonic Acid obtained - - - -	Grammes 0·0135	Grammes 0·0062	Grammes 0·0058	Grammes 0·0058
Volume of water escaping	Litre 1·0	Litre 1·0	Litre 1·0	Litre 1·0

Hence we obtain

	At $0^h\ 0^m$	At $0^h\ 30^m$	At $1^h\ 0^m$	At $1^h\ 30^m$
Volume of Carbonic Acid in 10,000 volumes of air -	72·07	33·10	30·99	30·99

It is thus seen that the carbonic acid diminished in half an hour from 0·7 to 0·3 per cent. of the total volume of air, although all direct ventilation was checked. After the first half hour, the amount of carbonic acid remained constant, possibly from the continued respiration of two persons in the inclosed atmosphere. The exchange of carbonic acid through closed windows, doors, and walls appears from this experiment to be very great.*

In order to form some idea of the amount of gaseous diffusion which takes place through brick and mortar walls, I have determined the quantity of carbonic acid which diffuses through a common brick. For this purpose a brick was cemented with pitch into the end of a box 3 feet long and 9 inches broad by 4½ deep. The interior of the box was lined with pitch, and carbonic acid was led into the box through two tubes cemented into the sides. After the box had stood for some minutes to allow the gas to diffuse equally throughout the space, a sample of the contained atmosphere was collected, by allowing the air from the box to enter a gas-collecting tube previously filled with mercury. The carbonic acid contained in the samples of air thus collected in consecutive hours was determined eudiometrically. In order to exclude an error arising from any possible leakage in the box, a second series of analyses were made in the same way, with the exception that the whole brick was covered with a layer of pitch, and thus the leakage determined.

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* See a similar experiment made independently by Prof. Pettenkofer, of Munich, on page 17.

The following table gives the result of the analyses:

Experiment II.

(A.) Determination of diffusive interchange through Brick.

(1.) Collected directly after filling.

	Vol.	Pressure.	C°	Vol. at 0° C & 0·76
Volume of gas employed - - -	122·1	0·7410	10·2	114·8
After absorption of carbonic acid -	102·8	0·7320	10·2	95·4
(2.) Collected after standing one hour.				
Volume employed - - - - -	104·1	0·7243	10·2	95·6
After absorption of carbonic acid -	89·1	0·7191	7·7	82·0
(3.) Collected after standing two hours.				
Volume employed - - - - -	104·3	0·7268	7·7	96·9
After absorption of carbonic acid -	92·5	0·7206	8·5	85·1

(B.) Control Experiment with pitched Brick.

(1.) Collected directly after filling.

	Vol.	Pressure.	C°	Vol. at 0° C & 0·76
Volume employed - - - - -	92·7	0·7053	6·6	84·0
After absorption of carbonic acid -	79·5	0·6974	5·3	71·6
(2.) Collected after standing three hours.				
Volume employed - - - - -	115·6	0·7233	6·0	107·7
After absorption of carbonic acid -	101·6	0·7235	7·0	94·3

From Experiment (A.) we have—

Sample 1, contained - - - - 16·96 per cent. carbonic acid.
" 2, " - - - - 14·22 " "
" 3, " - - - - 12·17 " "

Hence the loss of carbonic acid in first hour was - - - - - 2·74%
" " " in second hour was - - - - 2·05%

Total loss of carbonic acid in two hours - - - 4·79 per cent.

From Experiment (B.) we have - -

Sample 1 contained - - - - 14·76 per cent. carbonic acid.
" 2 " - - - - 12·45 " "

Hence the loss of carbonic acid in three hours was - - - - 2·31%
" " " in two hours was - - - - - 1·54%

The carbonic acid which diffused through the brick in two hours was, therefore, 4·79 − 1·54 = 3·25 per cent. on a total of 16 per cent. of carbonic acid. That is, that when a closed space contained 16 per cent. of carbonic acid, more than 3 per cent. escaped through a solid brick in two hours.

Another experiment with a piece of dried mortar of the size of the brick, and with hydrogen instead of carbonic acid, showed that a still greater exchange took place (calculated for carbonic acid) than was found with the brick.

The beneficial action of our brick and plaister walls is, therefore, not merely confined

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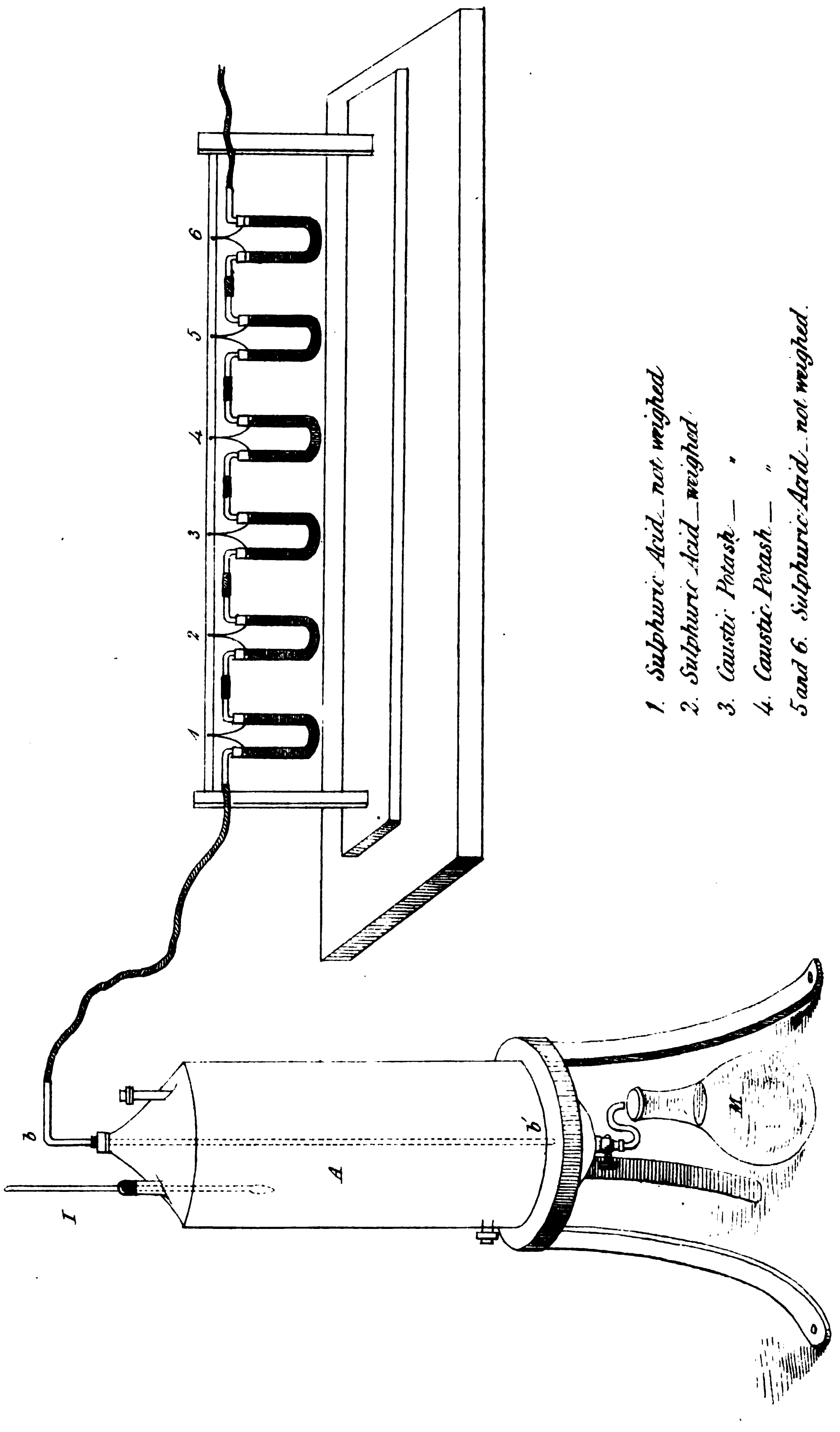
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1. Sulphuric Acid _ not weighed
2. Sulphuric Acid _ weighed
3. Caustic Potash _ "
4. Caustic Potash _ "
5 and 6. Sulphuric Acid _ not weighed.

J. Basire, litho.

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confined to taking up or giving off moisture to the air; for they are eminently hygroscopic; but a diffusive interchange goes on within the pores of the brick and mortar; so that our walls become, to a certain extent, an aid to ventilation.

The well-known unhealthiness of iron or new and damp houses may probably be to some extent thus accounted for.

Although I have been unable to pursue this branch of the subject further, there are hopes that our knowledge of the facts may soon receive important additions from my friend Professor Pettenkofer, of Munich, who is at pesent engaged on the more extended investigation of these points.

For the reason already given, viz., the impossibility of estimating the animal effluvia, my experiments have been chiefly confined to carbonic acid determinations, estimation of the dissolved aqueous vapour, and, in one instance, determination of the traces of carbonic oxide and hydrocarbons present in an enclosed inhabited atmosphere.

The method of experimenting which I have adopted is the following:

By means of a large aspirator (*A*, Fig. 1) a known volume of air (V), under a known pressure (P), and at a known temperature (t), can be drawn over a system of weighed tubes, alternately filled with pumice stone soaked in sulphuric acid and potash. The two tubes farthest from the aspirator contained sulphuric acid, for the purpose of drying the air; the next two tubes contained hydrate of potash, in a soft, spongy mass, in order to absorb the carbonic acid; and the next two contained sulphuric acid, to retain any trace of moisture which might be taken from the potash.

The increase of weight of the four last tubes gave the quantity of carbonic acid contained in the aspirated air.

The volume of dry air (V_1) at 0° C and 760^{mm} pressure of mercury, is obtained by help of Formula 1*, in which p signifies the tension of aqueous vapour at t° C.

$$V_1 = \frac{V\ (P-p)}{(1+0{\cdot}00366\ t)\ 0{\cdot}76} \quad - \ - \ - \ - \quad (1)$$

The volume of carbonic acid at 0° C and 0·76 pressure is found, in cubic centimetres, by multiplying the weight of carbonic acid found in grammes by 503·27, the volume in cubic centimetres of 1 gramme of carbonic acid at the normal temperature and barometric pressure.

In order to test the accuracy of the method, a determination was made of the carbonic acid contained in the free air of London on a windy day. (Feb. 27th, 1857).

Experiment gave the following results:

EXPERIMENT III.

Weight of carbonic acid obtained - - -	0·0308 grammes.
,, dissolved aqueous vapour - - -	0·2410 ,,
Volume of aspirated air - - - - -	43·2 litres.
Atmospheric temperature 8° C - - barometer	0·7725 m.

Hence we have—

The volume of air at 0° C and 0·76 - - - 42·28 litres, or
2580·3 cubic inches.

The volume of carbonic acid at 0° C and 0·76 - 15·50 c. c., or
0·945 cubic inch.

Or, 10,000 volumes of air contain 3·7 volumes of carbonic acid.

The amount of carbonic acid found by Saussure in the free atmosphere at Chambeisy, on the Lake of Geneva, was 3·8 in 10,000, as a mean of 17 experiments.

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Taking

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* In all the calculations the French decimal weights and measures (now universally employed in scientific investigations), are used. For the sake of comparison, I have reduced all the more important volumes to English cubic inches and cubic feet. One gramme = 15·442 English grains. One litre = 61·028 cubic inches.

Appendix.

Taking the specific gravity of aqueous vapour to be 0·623, we have in 42,230 volumes of air,—

41,915·5	volumes oxygen and nitrogen.
299·0	„ aqueous vapour.
15·5	„ carbonic acid.
42,230·0	

In order still more fully to test the trustworthiness of the method, I made use, in Experiment V., of twice as large an absorbing surface of potash as that previously and subsequently employed. The result of this analysis shows that the whole of the carbonic acid is withdrawn by two potash tubes.

The first carbonic acid determinations in closed inhabited spaces were made at the Wellington Barracks, in the rooms in which the men were sleeping.

EXPERIMENT IV.

Wellington Barracks, Room 16, House B. All ventilators, except one over fireplace closed. Common wide fireplace. Dimensions of chimney, 6 feet from floor, 1 ft. 4 in. by 9 in. Capacity of room, 7,920 cubic feet. Low fire in grate during experiment. Carbonic acid collected after 16 men had occupied the room for six hours (9^h P.M. to 3^h A.M.). Room thoroughly ventilated before entrance of men. Air collected 2½ feet from floor, at height of men's heads when in bed:

Weight of carbonic acid obtained - - -	0·0985	grammes.
„ aqueous vapour - - - - -	0·3438	„
Volume of aspirated air - - - - -	42	litres.
Duration of the experiment - - - -	$2^h\ 26^m$	
Temperature of air - - - - - -	15·0° C	
Barometric pressure - - - - - -	$0{\cdot}775^m$	

Hence we obtain—

Volume of carbonic acid -	at 0° C and 0·76 =	49·58 3·026	cub. cent., or cubic inches.
Volume of air - - -	at 0° and 0·76 =	39·93 2436·7	litres, or cubic inches.

Or in 10,000 volumes of air there are 12·42 volumes of carbonic acid.

The amount of aqueous vapour found was 8·609 grammes in the cubic metre, or 3·77 grains in the cubic foot. From the observations of the wet and dry bulb thermometers, wet = 55°·8 Fah., dry 62°·0 Fah.; the amount of aqueous vapour is calculated to be 8·9 grammes per cubic metre, or 3·89 grains per cubic foot. Hence the air of the soldiers' sleeping-room contained 66·2 per cent of the saturating quantity of aqueous vapour.

CHEMICAL MODE of determining the Amount of Ventilation.

We have assumed that a man exhales 0·686 cubic foot of carbonic acid per hour.

Hence, 16 men will exhale 65·86 cubic feet of carbonic acid in six hours.

We now require to know what quantity of air must be mixed with this 65·86 carbonic acid, so that the per-centage of this gas should amount to 0·1242, or the quantity found in the barrack room.

As the free atmosphere contains carbonic acid we must add more air than we should otherwise need.

If v represents the volume of pure air which must be added, and a, the fraction which the impurity in the air added (0.04), is of the limit of impurity in the mixture (0·1242), the volume of air (V) which must be added is found from the following expression:—

$$V = v + va + va^2 + \dots va^n$$

The three first terms of this series are all that need be considered.

In this way it is found, that in order to reduce 65·86 cubic feet of carbonic acid to 0·1242 of the total bulk, we require 76,600 cubic feet of air. That is, in six hours 76,600 cubic feet of air pass through the room, and carry off 0·1242 per cent. of their bulk of carbonic acid.

This gives to each man a volume of 13·3 cubic feet per minute; a quantity insufficient to remove completely all animal effluvia.

PHYSICAL METHODS of determining the Amount of Ventilation.

1. The quantity of air issuing from any chimney can be calculated, when the mean temperature and height of the chimney are known.

Temperature of outer air, 50° Fah.
Area of chimney pot, 60 square inches.
Height of chimney, 57 feet.
Temperature of chimney:

1. In grate, 2 feet above fire,	80°	Fah.
2. At ventilator	90°	„
3. Two feet from top	89°	„

From these data a volume of 275 cubic feet of air was found to issue from the chimney per minute.

EXPERIMENT V.

Wellington Barracks. House B. Room 14.
Conditions in every respect the same as in the previous experiment.
Double the usual number of potash tubes were employed.

Weight of carbonic acid obtained	0·0810 g^m.
„ water „	0·2653 „
Volume of aspirated air	36 litres.
Duration of the experiment	$2^h. 0^m$.
Temperature of the air	14°·9 C.
Barometric pressure	$0·776^m$

Wet bulb thermometer, 52°·2 Fah. Dry ditto, 58°·4 Fah.

Hence we have—

Volume of carbonic acid, at 0° C. and 0·76	40·77 cub. cent., or 2·488 cubic inches.
Volume of air, at 0° and 0·76	34·29 litres, or 2092·61 cubic inches.

Or, in 10,000 volumes of air, 11·89 volumes of carbonic acid.

The quantity of aqueous vapour was 7·74 grammes per cubic metre, or 3·38 grains per cubic foot. The thermometric observations give 8·3 grammes per cubic metre, thus agreeing closely enough with the chemical determinations, which were henceforward omitted.

From this experiment it is seen that, under like conditions, the quantity of carbonic acid, and consequently the amount of ventilation, in the soldiers' sleeping rooms, remains constant on two consecutive nights.

EXPERIMENT VI.

In order to determine the increase in the carbonic acid produced by a crowded state of the room, four additional men slept in the room on another occasion, making a total of twenty men, and the carbonic acid determined as before. The presence of a trace of carbonic oxide and hydrocarbons was also detected by passing

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passing the air, deprived of moisture and carbonic acid, over ignited oxide of copper; the water and carbonic acid formed by the oxidation of these gases being collected in weighed tubes, containing sulphuric acid and potash.

The other conditions, such as stoppage of ventilation, time at which the determination was made, &c., remained the same as in Experiment IV.

Weight of carbonic acid obtained	0·0801
Weight of carbonic acid and water from oxidation of CO and $C^{n}H^{n}$	0·0102
Volume of aspirated air	30 litres.
Temperature of air	12°. 5 C.
Barometric pressure	0·764^{m}.

Wet bulb thermometer, 47°·2 Fah. Dry ditto, 53° Fah.

Hence we have—

Volume of carbonic acid, at 0° C. and 0·76	40·32 c. c., or 2·460 cubic inches.
Volume of air at 0° and 0·76	28·43 litres, or 1735·00 cubic inches.

Or, in 10,000 volumes of air, 14·18 volumes of carbonic acid.

The volume of carbonic oxide and marsh gas corresponding to the weight of carbonic acid and water obtained, is found to be about one volume in 10,000.

The most important conclusion which we may draw from the foregoing determinations is, that even in cold weather an insufficient ventilation is obtained in the soldiers' sleeping rooms by means of accidental sources of fresh air, and the chimney draught occasioned by a small fire. In warmer weather, when the difference between the temperature of the outer and the inclosed air becomes less, the ventilation by chimney and windows alone will become more inefficient.

In order to determine how far the natural or accidental sources of ventilation supply the necessary exchange of air in cases in which the production of carbonic acid is more rapid, several determinations were made in crowded school-rooms, in which the direct access of fresh air was more or less checked.

EXPERIMENT VII.

Large boys' day school. Number of boys present, 164; capacity of room, 22.140 cubic feet. Imperfect ventilation from stove flue, and accidental sources. Determination made after the school had been occupied 2½ hours.

Weight of carbonic acid obtained	0·0519 g^{m}.
Volume of aspirated air	12 litres.
Temperature of the air	18° C.
Barometric pressure	0·759^{m}

Wet bulb. therm. 62° Fah., dry ditto, 66°·4 Fah.

Hence,—

Volume of carbonic acid at 0° and 0·76	26·12 c. c., or 1·593 cubic inch.
Volume of air at 0° and 0·76	11·01 litres, or 67.191 cubic inches.

Or, in 10,000 volumes of air, 23·71 volumes of carbonic acid.

This corresponds to an allowance of 330 cubic feet of air per head per hour (calculated as in Experiment IV.), or less than six cubic feet per minute.

The aqueous vapour amounted to 12 grammes per cubic metre, or 5·24 grains per cubic foot, representing 75·0 per cent. on the saturating quantity.

EXPERIMENT VIII.

The carbonic acid contained in the atmosphere of a crowded school, having a capacity of 4,640 cubic feet, and containing 67 boys, was next determined.

The only direct means of exchange of air consisted in a chimney draught and accidental openings from windows, doors, &c.

Weight of carbonic acid obtained - - - 0·0687 g^{m}.
Volume of aspirated air - - - - - 12 litres.
Temperature of the air - - - - - 12° C.
Barometric pressure - - - - - 0·7478 ^{m}.
Wet bulb thermometer, 51° Fah. Dry ditto, 54°·5 Fah.

Hence—

Volume of carbonic acid at 0° and 0·76 - - 34·57 c. c., or 2.11 cubic inches.

Volume of air at 0° and 0·76 - - - - 11·15 litres, or 680·45 cubic inches.

Or, 10,000 volumes of air contain 31·00 volumes of carbonic acid.

This gives a ventilation amounting to 240 cubic feet per head per hour, or four cubic feet per minute.

The chief results of the foregoing experiments are given in the following Table:

TABLE I.

RESULTS of the Carbonic Acid Determination in various Localities.

NUMBER and LOCALITY of the EXPERIMENT.	Carbonic Acid found in 1,000 Volumes of Air.	Cubic Capacity of Inclosed Space.	Number of Persons contained.	Number of Cubic Feet, per Head per Minute.	Amount of Aqueous Vapour, Saturating Quantity = 100
	Volumes.	*Cubic Feet.*		*Cubic Feet.*	
Experiment III:					
Unconfined air - -	0·37	-	- -	- -	65·5
Experiment IV:					
Wellington Barracks -	1·242	7,920	16	13·3	66·2
Experiment V:					
Wellington Barracks -	1·189	7,920	16	13·0	59·5
Experiment VI:					
Wellington Barracks -	1·418	7,920	20	- -	65·0
Experiment VII:					
Large School-room -	2·371	22,140	164	6	75·0
Experiment VIII:					
School-room - -	3·100	4,640	67	4	74·0
Experiment XIV:					
Crowded Theatre.					
1. Air from gallery -	3·212	- -	not determined	- -	47·0
2. Air from pit - -	2·637				

It is thus seen that the exchange of air obtained solely from the accidental sources is insufficient to reduce the carbonic acid to the advisable limit, in the case of crowded school-rooms.

The subject to which I next directed my attention was the distribution of carbonic acid throughout inhabited spaces, ventilated by a chimney, together with

Appendix.

windows and doors. That is, does the carbonic acid exist uniformly diffused throughout the atmosphere of the closed inhabited space, or do particular portions of this atmosphere contain more of this gas than other portions?

Much has been written, and many opinions have been expressed upon this question, but no direct chemical experiments have, as far as I can learn, ever been made with a view of definitely settling this point.

It has been stated that, in common dwelling rooms, the heated carbonic acid formed by respiration and combustion of illuminating substances ascends and accumulates in the upper parts of the rooms, and is not carried off by the current of fresh air entering by the doors and windows, and issuing by the fire-place into the chimney. A permanent atmosphere of impure air is thus supposed to exist in all rooms not artificially ventilated at top, and persons breathing the air above the level of the chimney opening were conceived to be respiring an unhealthy air, whilst persons who respired the air below this level were asserted to be consuming a healthy air free from any increased amount of carbonic acid.

This supposition is however rendered extremely doubtful from two purely theoretical considerations:

1. The known laws of expansion, by heat, of gases.
2. The known laws of diffusion of gases.

And, on appealing to direct experiment, this theoretical presumption is most fully confirmed.

Experiment, both physical and chemical, has proved that in ordinary dwelling rooms, even in the exaggerated form of crowded school-rooms, the two causes above alluded to are quite sufficient to equalise throughout the closed space the amount of carbonic acid formed by respiration; that, in fact, the atmospheres of such enclosed spaces are homogeneous as regards the contained carbonic acid.

See Special Report on the Experiments.

The important physical experiments and observations made by the Assistant Secretary of the Board of Health on the force and direction of the currents of air in an artifically heated room, show in the most complete manner that the first cause previously mentioned, viz., the laws of expansion of gases by heat, is in itself sufficient to prove the impossibility of an accumulation of impure air in any particular part of the room. Mr. Campbell has most clearly shown that a continued and rapid circulation of air takes place throughout the whole inclosed space, arising from the heating effects of the fire.

In order to determine chemically whether or not the air above the level of the chimney opening contained more carbonic acid than the air below the level, simultaneous determinations of the carbonic acid in the air collected from these two positions were made in rooms not artificially ventilated.

The first simultaneous carbonic acid determination in the air of two different parts of a room was made in a small room inhabited by a costermonger's family.

Experiment IX.

Capacity of room, 950 cubic feet, containing nine persons. Chimney draught from small fire, together with accidental sources, only means of ventilation.

Two carbonic acid determinations made at the same time.

(A.) Air collected 6 inches from Ceiling.

Weight of carbonic acid obtained - - - -	0·0266 g^m.
Volume of air aspirated - - - - - -	12 litres.
Temperature of the air - - - - - -	16° C.
Barometric pressure - - - - - - -	0·7425^m.

Hence we have—

Volume of carbonic acid at 0° and 0·76 - -	13·39 c. c., or 0·816 cubic inch.
Volume of air at 0° and 0·76 - - - - -	11·03 litres, or 673·13 cubic inches.

Or, in 10,000 volumes of air, 12·13 volumes carbonic acid.

(B.) Air collected 2½ feet from Floor, below level of Chimney-piece.

Weight of carbonic acid obtained - - - - - 0·0280 g^{m}.
Volume of aspirated air - - - - - - - 12 litres.
Temperature of the air - - - - - - - 16° C.
Barometric pressure - - - - - - - - 0·7425^{m}.
Wet bulb thermometer, 58°·5 Fah. Dry ditto, 65°·0 Fah.

Hence we have—
Volume of carbonic acid, at 0° and 0·76 - - 14·09 c. c., or 0·859 cubic inch.
Volume of air, at 0° and 0·76 - - - - - 11·03 litres, or 673·13 cubic inches.
Or, in 10,000 volumes air, 12·76 volumes carbonic acid.

Experiment X.

Crowded school-room. Capacity, 4,640 cubic feet. Number of boys, 70:
Barometric pressure - - - - - - - - - 0·7427^{m}.
Temperature of air - - - - - - - - 14°·5 C.

(A.) Air collected 6 inches from Ceiling.

Weight of carbonic acid obtained - - - - - 0·0719 g^{m}.
Volume of aspirated air - - - - - - 12 litres.

Hence—
Volume of carbonic acid, at 0° and 0·76 - - 36·19 c. c., or 2·208 cubic inches.
Volume of air, at 0° and 0·76 - - - - - 10·95 litres, or 668·24 cubic inches.
Or, in 10,000 volumes of air, 33·05 volumes of carbonic acid.

(B.) Collected 3 feet from Floor, below level of Chimney-piece, at height of Boys' Heads when sitting.

Weight of carbonic acid obtained - - - - - 0·0708 g^{m}.
Volume of air aspirated - - - - - - - 12 litres.

Hence—
Volume of carbonic acid, at 0° and 0·76 - - 35·63 c. c., or 2·173 cubic inches.
Volume of air, at 0° and 0.76 - - - - - 10·95 litres, or 668·24 cubic inches.
Or, in 10,000 air, 32·53 volumes of carbonic acid.

Experiment XI.

Another determination in the same situation, under similar circumstances:
Barometric pressure - - - - - - - - 0·7627^{m}.
Temperature of air - - - - - - - - 12°·5 C.

(A.) Collected 6 inches from Ceiling.

Weight of carbonic acid obtained - - - - - 0·0539 g^{m}.
Volume of aspirated air - - - - - - - 12 litres.

Hence—
Volume of carbonic acid, at 0° and 0·76 - - 27·12 c. c., or 1·655 cubic inch.
Volume of air, at 0° and 0·76 - - - - - 11·35 litres, or 692·86 cubic inches.
Or, in 10,000 air, 23·90 volumes of carbonic acid.

(B.) Collected 2½ feet from Floor.

Weight of carbonic acid obtained - - - - 0·0555 g^{m}.
Volume of aspirated air - - - - - - - 12 litres.

Hence—

Volume of carbonic acid, at 0° C. and 0·76 - - 27·93 c. c., or 1·704 cubic inch.

Volume of air, at 0° C. and 0·76 - - - - 11·35 litres, or 692·9 cubic inches.

Or, in 10,000 air, 24·59 volumes carbonic acid.

EXPERIMENT XII.

Simultaneous carbonic acid determinations made in a larger and more crowded school-room (for dimensions, &c., *see* Experiment VII.):

Barometric pressure - - - - - - - 0·7485^{m}
Temperature of air - - - - - - - - 15° C.

(A.) Air collected 6 inches from Ceiling.

Weight of carbonic acid obtained - - - - 0·0590 g^{m}.
Volume of aspirated air - - - - - - - 12 litres.

Hence—

Volume of carbonic acid, at 0° and 0·76 - - 29·69 c. c., or 1·811 cubic inch.

Volume of air, at 0° and 0·76 - - - - 11·01 litres, or 671·91 cubic inches.

Or, in 10,000 air, 26·96 volumes carbonic acid.

(B.) Air collected 3 feet from Floor.

Weight of carbonic acid obtained - - - 0·0645 g^{m}.
Volume of aspirated air - - - - - - 12 litres.
Volume of carbonic acid, at 0° and 0·76 - - 32·46 c. c., or 1·981 cubic inch.

Volume of air, at 0° and 0·76 - - - - 11·01 litres, or 671·91 cubic inches.

Or, in 10,000 air, 29·48 volumes carbonic acid.

EXPERIMENT XIII.

Simultaneous carbonic acid determinations made at the Wellington Barracks, Room 25, supplied with Arnott's stove and ventilator, both flue and ventilator fully open; fire nearly out; 20 men in room. Dimensions as in Experiment IV:

Barometric pressure - - - - - - - - 0·764^{m}.
Temperature - - - - - - - - - - 16°·0 C.

(A.) Air collected 3 inches from Ceiling.

Weight of carbonic acid obtained - - - 0·0308 g^{m}.
Volume of air aspirated - - - - - - 12 litres.

Hence—

Volume of carbonic acid, at 0° and 0·76 - - - 15·50 c. c., or 0·945 cubic inch.

Volume of air, at 0° and 0·76 - - - - 11·20 litres, or 683·5 cubic inches.

Or, in 10,000 volumes air, 13·82 volumes carbonic acid.

(B.) Air collected 2½ feet from Floor:—

Weight of carbonic acid - - - - - - 0·0375 g^{m}.
Volume of air aspirated - - - - - - 12 litres.

Hence—

Volume of carbonic acid, at 0° and 0·76 - - 18·87 c. c., or 1·151 cubic inch.
Volume of air, at 0° and 0·78 - - - - 11·20 litres, or 683·5 cubic inches.

Or, in 10,000 volumes air, 16·84 volumes carbonic acid.

These experiments prove that in inhabited dwelling or school rooms the carbonic acid is equally diffused throughout the air; the small differences observed, arising partly from the unavoidable errors of experiment, and partly from variable local circumstances, therefore confirms in a striking manner the conclusions derived from physical observations.

The following Table gives the chief results obtained:

Distribution of Carbonic Acid.

TABLE of the Results of the simultaneous Carbonic Acid Determinations.

TABLE II.

NUMBER and LOCALITY of the EXPERIMENT.	Carbonic Acid in 1,000 vols. of Air. 1. Collected 6 in. from Ceiling.	Carbonic Acid in 1,000 vols. of Air. 2. Collected 2½ ft. from Floor.	Deviation from Mean.	Cubic Capacity of Room.	Number of Persons contained.
Experiment IX.: Small dwelling-room -	1·213	1·276	∓0·031	940	9
Experiment X.: School-room - - -	3·305	3·253	±0·016	4,640	70
Experiment XI.: Same school-room -	2·390	2·459	∓0·034	4,640	70
Experiment XII.: Large school-room -	2·696	2·948	∓0·126	22,140	160
Experiment XIII.: Wellington Barracks -	1·382	1·684	∓0·152	7,920	20

In order to determine the difference in the composition of the atmosphere at the top and bottom of a crowded public building, simultaneous carbonic acid determinations were made in the air collected from the pit and gallery of a fashionable theatre when quite full.

EXPERIMENT XIV.

By means of a system of tubes the air was collected at a height of four feet above the stage over the stalls, and also at a distance of 30 feet directly above the first position.

Barometric pressure - - - - - - $0·7377^{m}$.
Temperature of the air - - - - - 23° C.

Appendix.

(A.) Air collected 34 feet above Stage.

Weight of carbonic acid found	0·0444 g^{m}
Volume of air aspirated	8 litres.

Hence—

Volume of carbonic acid, at 0° and 0·76	22·34 c. c., or 1·365 cubic inch.
Volume of air, at 0° and 0·76	6·96 litres, or 424·74 cubic inches

Or, in 10,000 air, 32·12 volumes carbonic acid.

(B.) Air collected 4 feet above Stage.

Weight of carbonic acid obtained	0·0547 g^{m}.
Volume of air aspirated	12 litres.

Hence—

Volume of carbonic acid, at 0° and 0·76	27 53 c. c., or 1·68 cubic inch.
Volume of air, at 0° and 0·76	10·44 litres, or 637·12 cubic inches.

Or, in 10,000 volumes of air, 26·37 volumes carbonic acid.

This experiment shows that a considerable difference exists in the composition of the atmosphere, in various parts of crowded and heated public buildings.

It is impossible, from the foregoing experiments, or from any, except a most extended series, to lay down a general statement regarding the amount of artificial ventilation requisite in dwelling rooms under varying conditions. In some circumstances an artificial egress for deteriorated air will be necessary, but it has been shown that, under all circumstances, an artificial ingress for fresh air is essential.

Henry E. Roscoe.

RESULTS of EXPERIMENTS on VENTILATION made at *Munich*, communicated by Professor *Pettenkofer*.

THE carbonic acid contained in the atmosphere of closed inhabited spaces was determined by a volumetric method, which was found to give very accurate results.

EXPERIMENT I.

Air from a ward of a lying-in hospital containing 26 patients, without ventilation

				In 1,000 air.	
1.	Air collected	1 foot from ceiling	contained	2·69	carb. acid
2.	Ditto	ditto	ditto	2·63	„
3.	Ditto	1 foot from floor	ditto	2·20	„
4.	Ditto	ditto	ditto	2·24	„
5.	Ditto	near an inner wall	ditto	2·27	„

EXPERIMENT II.

Air from a ward with ventilation, containing 5 women and 4 children:*

			In 1,000 air.	
1.	Air collected	2 inches from ceiling	0·68	carb. acid.
2.	Ditto	ditto	0·74	„
3.	Ditto	6 inches from floor	0·38	„
4.	Ditto	ditto	0·39	„

---

* The great difference observed in this experiment between the amount of carbonic acid above and below, is completely explained by the local conditions of ventilation.

EXPERIMENT III.

Exchange of air in a room of 3,000 cubic feet capacity, when all doors and windows were shut.

	In 1,000 air.
1. After ventilating the room it contained - - -	0·38 carb. acid.
Ditto ditto ditto - - -	0·34 carb. acid.
Temperature - - -	13° C.
2. After burning 2 lbs. charcoal in the room it contained -	14·09 carb. acid.
Temperature - - -	23°·5 C.
3. After 1 hour the room contained - - - -	5·12 carb. acid.
Temperature - - -	19° C.
4. After 2 hours the room contained - - - -	2·15 carb. acid.
Temperature - - -	18° C.
5. After 3 hours the room contained - - - -	1·13 carb. acid.
Temperature - - -	17° C.

EXPERIMENT IV.

Increase and diminution of the carbonic acid contained in the air of Liebig's lecture room 46,256 cubic feet capacity, during an evening lecture, when 350 persons were present.

Most of the audience were in the room at 5^h 30^m P.M. The lecture lasted from 6^h to 7^h P.M.

No. 1.

	In 1,000 air.	Temperature.
Air collected at 6^h 0^m P.M. contained - -	1·08 carb. acid.	14°·5 C.
Ditto 6^h 30^m P.M. ditto - -	2·28 „	20° C.
Ditto 7^h 0^m P.M. ditto - -	3·22 „	22° C.

No. 2.

A second series of determination made on another evening. Number of audience 330 :—

	In 1,000 air.	Temperature.
After ventilation of lecture room 5^h 15^m - -	0·27 carb. acid.	14° C.
Collected at 6^h 5^m contained - - - -	1·18 „	18° C.
Ditto 6^h 30^m „ - - - -	2·33 „	20° C.
Ditto 7^h 0^m „ - - - -	3·22 „	22° C.
Ditto 7^h 45^m „ - - - -	1·48 „	12° C.

TABLE of Dr. *Pettenkofer's* RESULTS on VENTILATION.

I. CARBONIC ACID in Ventilated and Non-ventilated Wards of a Lying-in Hospital, *Munich*.

	Carbonic Acid in 1,000 Volumes of Air.	
	1. Non-Ventilated.	2. Ventilated.
Collected 1 ft. from ceiling - - -	2·66	0·71
Collected 1 ft. from floor - - -	2·24	0·39

II. DETERMINATION of Exchange of Carbonic Acid in a Room with closed Windows and Doors.

Capacity of Room, 3,000 Cubic Feet.	Carbonic Acid in 1,000 Vols. Air.	Temperature.
1. After ventilating the room - - -	0·33	13° C.
2. After burning 2 lbs. charcoal - -	14·09	23°·5 C.
3. After one hour had elapsed - -	5·12	19° C.
4. After two hours - - - -	2·15	18° C.
5. After three hours - - - -	1·13	17° C.

Appendix.

III. Determination of Increase and Diminution of Carbonic Acid in the Atmosphere of *Liebig's* Lecture Room, during an Evening Lecture, in which 350 Persons were present. Lecture from 6—7 o'clock, p. m.

Capacity of Room, 46,256 Cubic Feet.	Carbonic Acid in 1,000 Vols. Air.	Temperature.
1. Room thoroughly ventilated - -	0·27	14° C.
2. Collected at 6 o'clock - - -	1·13	16° C.
3. „ 6 h. 30 m. - - -	2·30	20° C.
4. „ 7 h. 0 m. - - -	3·22	22° C.
5. „ 7 h. 45 m. - - -	1·48	18° C.

Experiments made at the Board of Health to ascertain the Movements of Air in a Room with a Fire lighted in an open Fireplace (*Arnott's*), by *J. F. Campbell*, Esq.

1. A balloon filled with a light gas was weighted with pins stuck into a pen suspended to it, till it was as nearly as possible of the same specific gravity as the atmosphere in the stillest part of the room. It was found that the balloon so balanced, when placed opposite to and near the fire, expanded, ascended, and moved steadily along the ceiling, from the fireplace towards one or other of the windows; it there descended to the floor, and unless it got anchored to the carpet, it moved towards the fireplace, and again ascended. It was found that any person moving in the room in the neighbourhood of the balanced balloon, any draught from a door or window, or any other slight disturbing cause, altered the direction in which the balloon moved, though the general course was as described.

As the balloon was moved by the air, it follows, that air near the fire, and acted on by it, ascends as the balloon ascended. It is continually ascending, and as it can neither escape nor accumulate at the ceiling, it *must* flow from the place where it ascends; that is, from above the fireplace towards the windows and walls, where it contracts and becomes heavier, falls by its own weight, and is forced downwards by fresh quantities of heated air expanding and following in the same track. In like manner, because air cannot accumulate on the floor, the descending currents at the windows, and those originating there from the coldness of the glass, must give rise to currents moving towards the fireplace near the floor, in the direction in which the balloon actually moved; and further, any person in the room must cause movements in the air such as were shown by the movements of the balloon.

If, then, the air of a room be circulating thus rapidly, foul air cannot accumulate in any great excess at any part of it; but on the contrary, different qualities of air must be speedily mixed.

2. To show more clearly what the balloon had indicated, a number of filaments of floss silk (about six inches long, teased out, and made very fine) were fastened on the ceiling with wafers, as shown by the spots on the Plan, No. 1.

A number of similar vanes were attached to pens, and these were fastened to a pole reaching from the floor to the ceiling, and others were fastened to the mantelpiece. (*See Section No.* 2.)

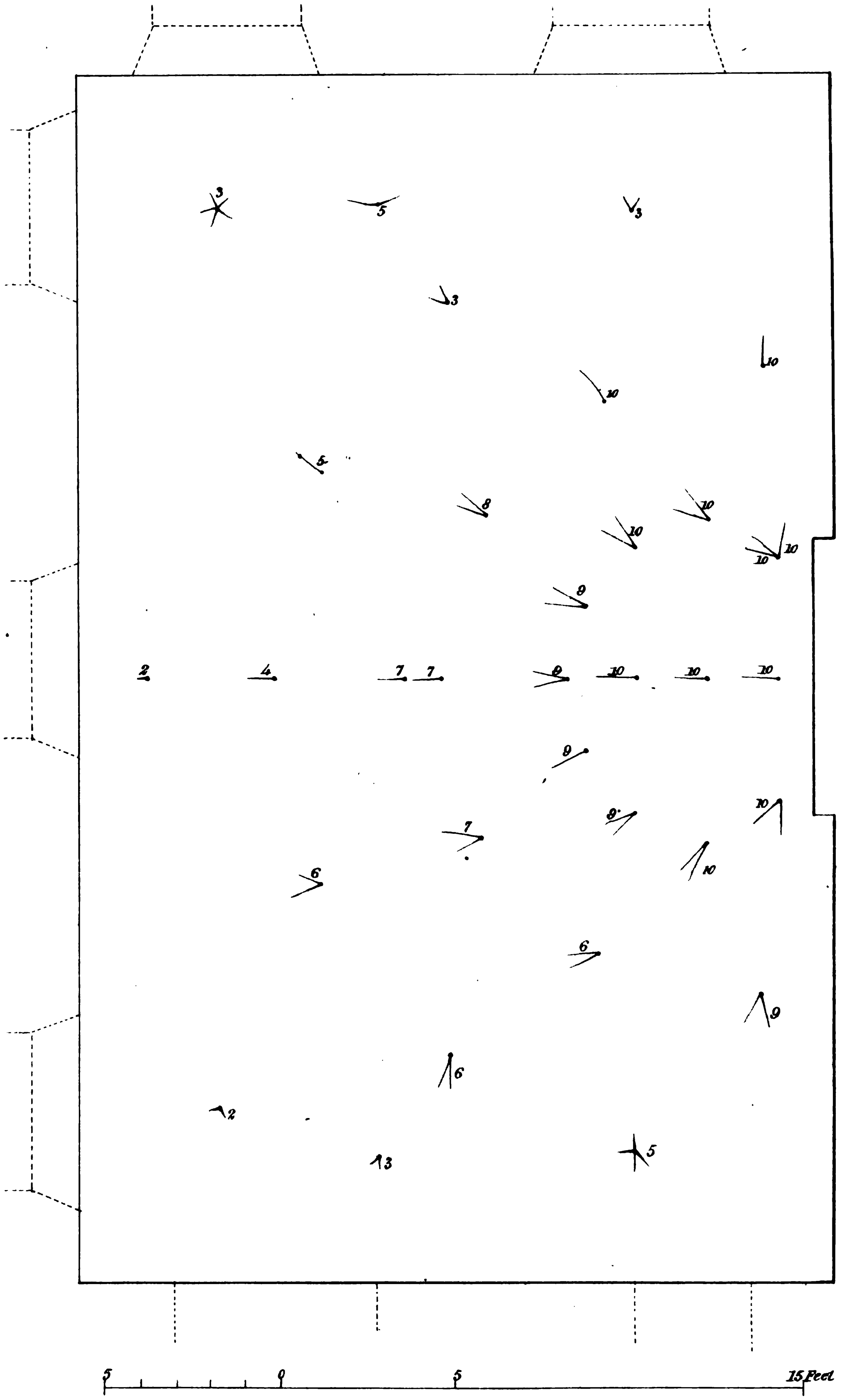
Where the air was stagnant, the free ends of the vanes pointed steadily to the floor. Where it was descending, they pointed downwards and moved about; where the air was moving horizontally, the silk was bent in the same direction. Where the current was more or less strong, the silk was more or less bent, and showed the comparative strength of the moving power at different points. Where the air was ascending, the vanes pointed upwards.

It became at once evident that the air was rising at the mantel-piece, and flowing

PLAN, No. 1.

[To face page 145.]

Plan of Board Room Ceiling; showing positions, directions, and amount of Horizontal deflection of Silk Vanes estimated thus: 10



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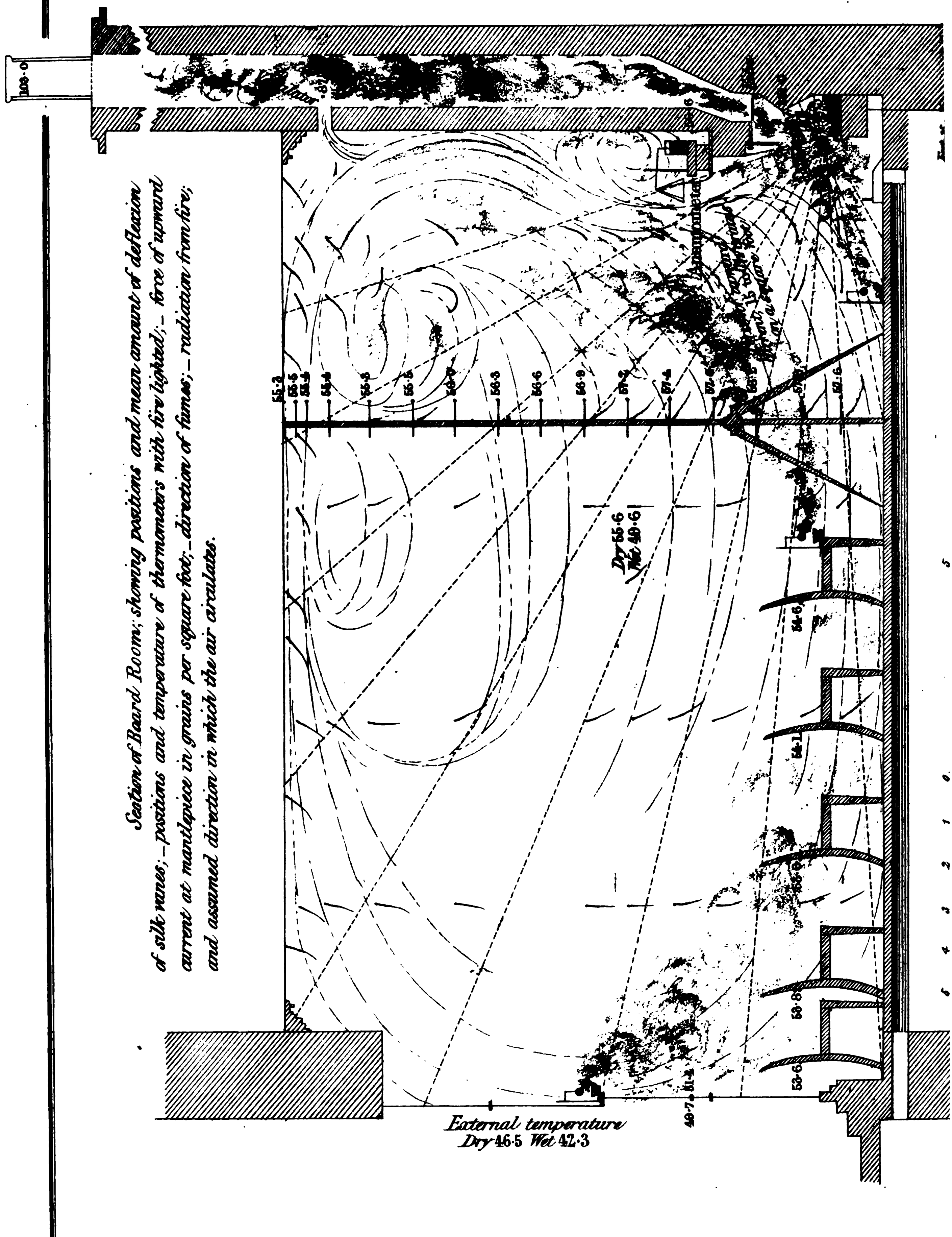
Section, Nº 2.

[To face Plan Nº 1.]



Section of Board Room; showing positions and mean amount of deflexion of silk vanes;—positions and temperature of thermometers with fire lighted;—force of upward current at mantlepiece in grains per square foot;—direction of fumes;—radiation from fire; and assumed direction in which the air circulates.

External temperature
Dry 46·5 *Wet* 42·3

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flowing rapidly along the ceiling, in lines radiating from a point above the fire, as shown on the Plan, No. 1, and that the ventilator was *not* drawing air from the ceiling so as to interfere with the direction of vanes fastened close to and above it, which pointed directly away from it. By moving the pole to different positions across the room, the direction of the currents, as shown by the silk vanes, was found to coincide with that indicated by the balloon, and shown by the lines on the section, No. 2, and on the annexed drawing, Fig. 1.

3. To estimate the force of the current so ascertained to exist, a piece of cardboard, of known dimensions, was suspended to one arm of the beam of a balance, and placed at the edge of the mantelpiece in the ascending current. The graduated stem of a broken thermometer was suspended to the other end of the beam, and placed in a glass vessel containing water; weights were placed on the cardboard till the graduated glass rod was raised from the bottom of the glass vessel, and the zero point was level with the surface of the water. The markings on the rod were read by looking with a magnifier through the water along its under surface, and the number of degrees moved indicated the force acting on the card. The value of each division on the scale was ascertained by adding weights to the card, the instrument being placed on a table in the stillest part of the room. It was found that the force of the upward current at the mantelpiece was considerable, and that it varied in strength; that it was strongest in the centre, but that it extended to both sides of the mantelpiece; and that the upward current has a force of from 15 to 4½ grains to the square foot. The force diminishes as the fire gets low; but the same action goes on even when the fire is extinguished. The same experiment has been tried in several rooms with open fireplaces, and the result was nearly the same in all.

The same instrument, with slight modifications, would measure the force of lateral currents, however strong; but it was thought sufficient, in this instance, to note the strength of the ascending current at its source. The comparative strength of the currents in the room, along a line drawn from the fire to the window opposite to it, is shown on the Section, No. 2. The directions in which the vanes pointed were marked down in the room, on a drawing made to scale by one observer, while another at the end of the room noted the points in the room to which the free end of the silk pointed; and the same course was pursued in marking down the direction of the vanes on the ceiling. (*See* Fig. 3.) It was found that the currents varied slightly, both in strength and direction; though, when the observers remained stationary, both strength and direction were pretty constant; but a person breathing, or moving about the room, caused the vanes above him to alter their direction.

4. To make the moving currents visible, a fuming apparatus was placed in the window, and at points along the floor, as shown on the Section, No. 2. It consisted of a sponge filled with muriatic acid, suspended above a small basin of ammonia. The cold fumes so generated were better than smoke from burning substances, because warm smoke moves independently of the general current in the room. The fumes showed the same currents as did the other experiments; but they also showed an eddy above the mantelpiece, falling along the wall for about two feet. This eddy is mentioned because it has been asserted that there is a descending current above the fireplace. (*See* Fig. 4.)

On warm days, when the sun shines on the carpet through the windows, and no fire is lighted, the currents are reversed. Those parts of the room where the carpet is warmed by the sun become the warmest. The air there ascends, and flows from the windows along the ceiling towards the ventilator, which works freely, opening and shutting at short intervals. The air then enters the room by the chimney, and escapes by the doors.

The result of these experiments is, that the whole air in a room is in rapid circulation while the fire is lighted. It circulates less rapidly when it is extinguished, so long as any one part of the room is warmer than another. The experiments do but confirm what seems to follow from the admitted facts, that warm air is lighter than cold, and occupies a larger space; and they seem to show that an open chimney with a fire lighted will serve to remove foul air from dwelling-rooms, without any special opening communicating with the chimney from the upper part of the room.

Appendix.

Experiments to test the quantity of air escaping by the chimney were made with the French anemometer. They were made on a windy day, when the fire was not lighted, but while the chimney was still warm. The instrument was held in the chimney, about six inches down; and it appeared that 125 cubic feet per minute were escaping from a room whose cubic contents were 10,159 feet. In about an hour and a quarter that quantity of air escaping from the room equals its cubic contents. The other experiments show as probable that the different qualities of air in the room are equally mixed; and it appears to follow that no special ventilation beyond that of the chimney is needed, so long as the chimney is warm, if the external air be suffered to enter the room freely; but the external air should be warmed to save fuel.

The anemometer, placed in a neighbouring chimney, with a fire lighted, showed an escape of 1,004 cubic feet per minute. The rate in both chimneys varied continually: the instrument went slowly, and occasionally even stopped, in the chimney without a fire; but when gusts of wind passed it showed a rapid upward draught in both: 125 feet was taken as the mean of a number of trials.

The results obtained from the anemometer observations are questionable; each turn was taken to indicate a foot lineal, because by walking a certain number of feet with the instrument, it was found to turn about an equal number of times; but though this may give a rough estimate of the quantity of air passing, it can do no more, because the number of turns made in walking a given number of feet was found to vary according to the pace. The instrument must also give various results according to its condition: a grain of dust would suffice to alter the result materially.

1. [To face page 146]

Fig. 1.

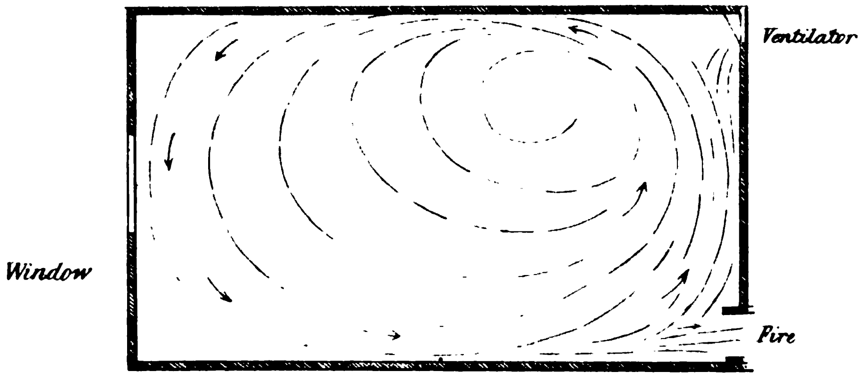


Fig. 2.

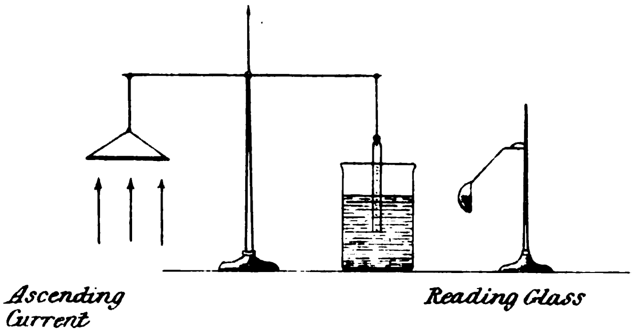


Fig. 3

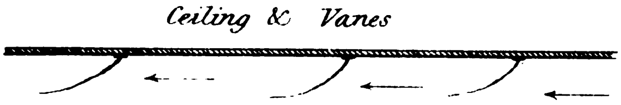
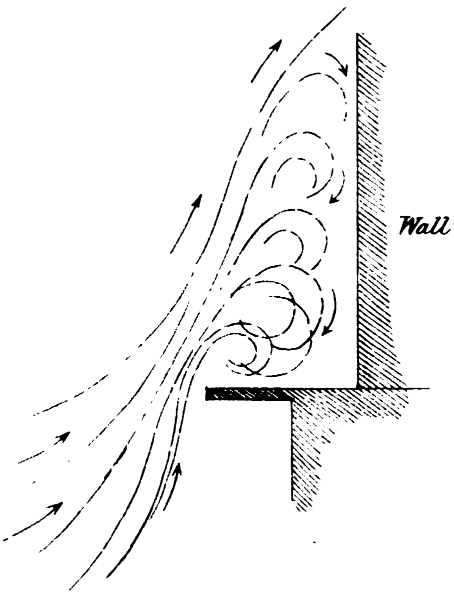


Fig 4.



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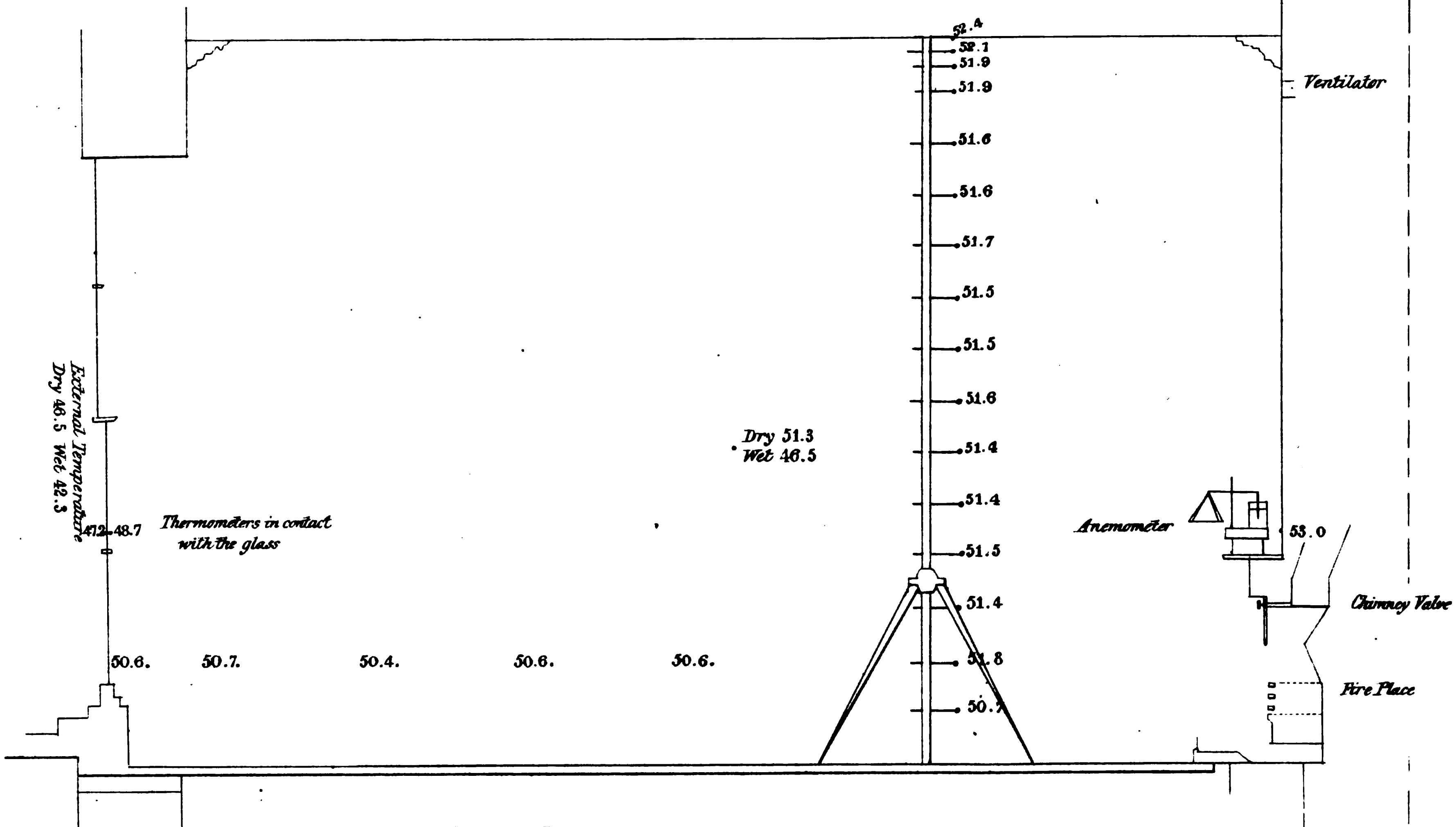
2. [To face page 146]



Section of Board Room shewing external and internal temperature before the fire was lighted; — means deduced from 255 readings.

John C. Haile del.

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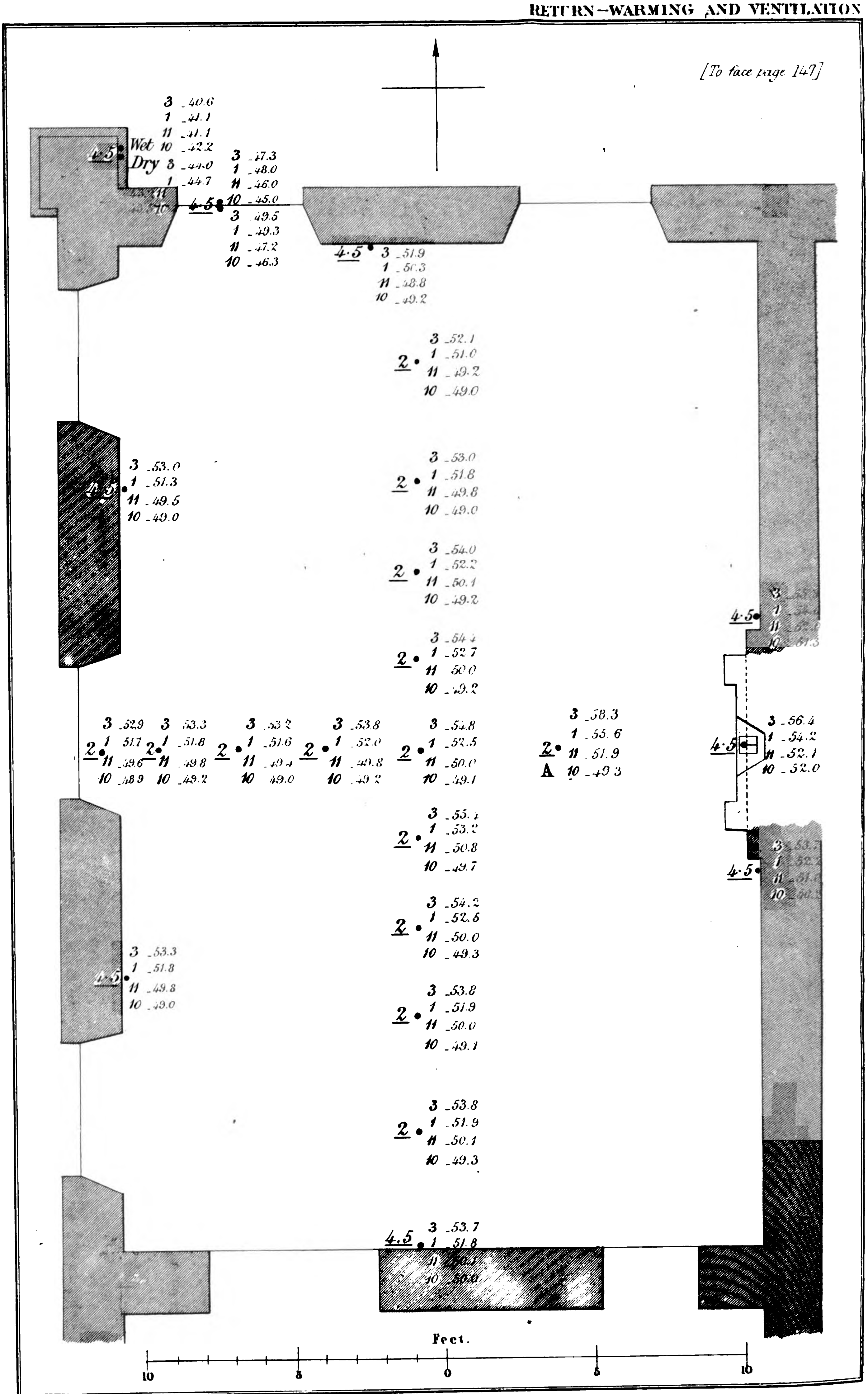

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GENERAL BOARD OF HEALTH.

BOARD ROOM.—ARNOTT'S STOVE.

THE black marks on the Plan represent the bulbs of the thermometers.

The black figures with a line under them indicate the heights of the bulbs above the floor in feet and decimals; the other black figures express the times of observation; and the red figures are the observations.

The aperture in the chimney throat is 6 inches by 6.5 inches; but the centre piece upon which the valve acts is 0.5 of an inch, therefore the aperture is 6 × 6 inches, or 36 inches area.

The observations from 1 foot to the ceiling, tabulated below, were taken at the point A., which is 6 feet from the fire; those at 10 a.m. being taken before the fire was lighted.

WEDNESDAY, 25TH MARCH 1857.

Fire lighted at 10.30 a.m.

TIME.	Centre of Room, 6 Feet from Floor.		HEIGHTS FROM FLOOR—IN FEET AND DECIMALS.																	
	Thermometer.		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	13.5.	13.75.	Ceiling, 14.0.
	Dry.	Wet.																
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
10 a.m. -	49.9	45.2	49.1	49.3	50.1	50.4	50.1	50.1	50.3	50.2	50.2	50.3	50.2	50.2	50.7	50.6	50.7	51.1
11 " -	51.6	46.3	51.8	51.9	52.3	52.1	51.9	51.9	52.0	51.8	51.5	51.4.	51.1	51.1	51.2	51.2	51.3.	51.5
1 p.m. -	53.7	48.1	55.0	55.6	55.9	55.5	55.2	54.9	55.0	54.8	54.3	54.1	53.7	53.7	53.7	53.7	53.7	53.4
3 " -	55.7	49.3	57.9	58.3	58.8	58.2	57.8	57.3	57.2	57.0	56.3	56.0	55.3	55.2	55.2	55.1	55.1	55.0

All blinds down, and ventilator closed during the day.

Dark day; wind from south-east to south; moderate breeze.

GENERAL BOARD OF HEALTH.

Board Room--Arnott's Stove.

The black marks on the Plan represent the bulbs of the thermometers.

The black figures with a line under them indicate the heights of the bulbs above the floor in feet and decimals; the other black figures express the times of observation; and the red figures are the observations.

The aperture in the chimney throat is 6 inches by 6.5 inches; but the centre piece upon which the valve acts is 0.5 of an inch, therefore the aperture is 6 × 6 inches, or 36 inches area.

Thursday, 26th March 1857.

Fire lighted at 10.20 a.m.

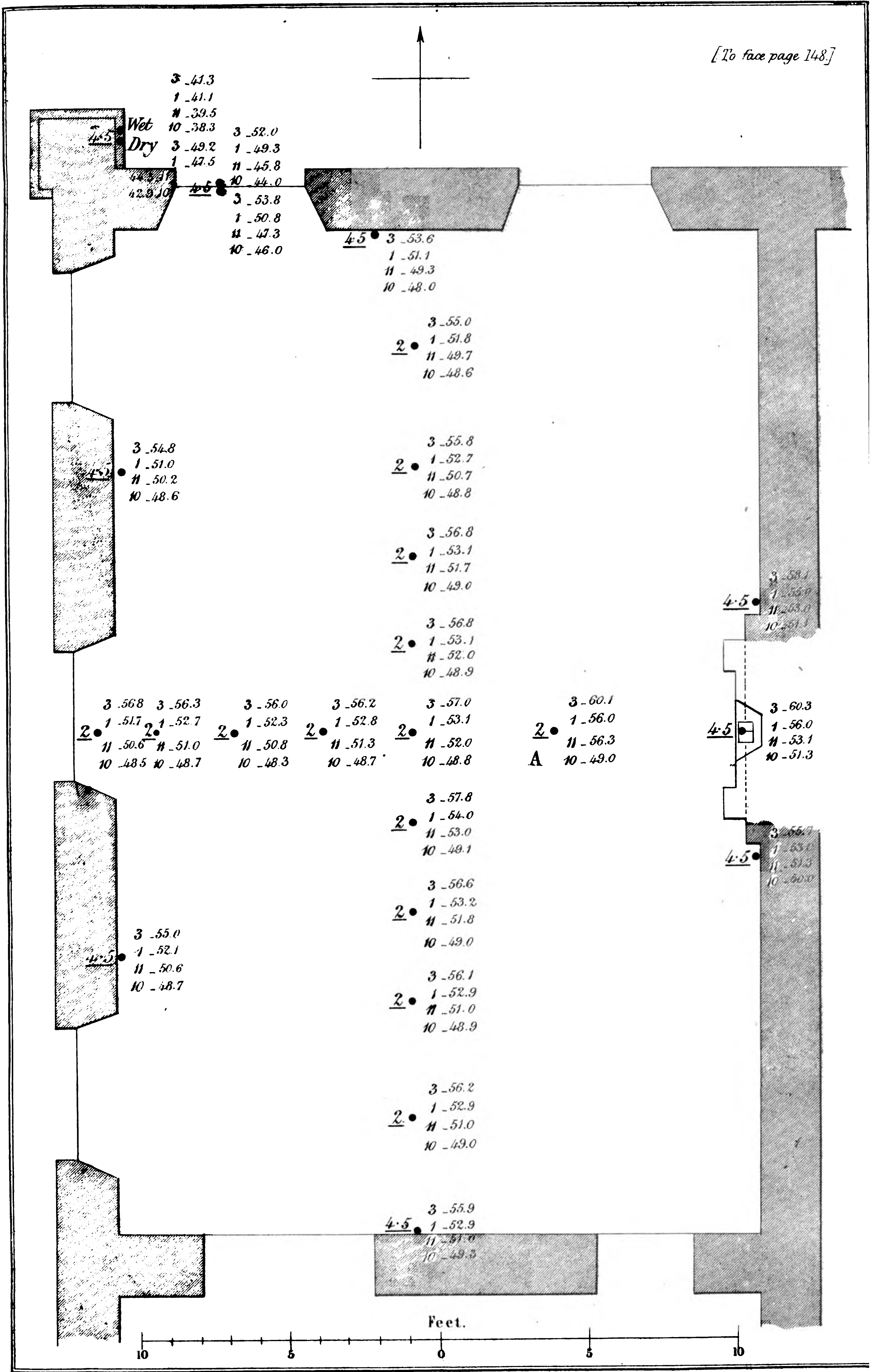
Observations from 1 foot to Ceiling, taken at the point A.

TIME.	Over Fire, 10 Inches from Valve in Chimney Throat.	Centre of Room, 6 Feet from Floor. Thermometers.		HEIGHTS FROM FLOOR IN FEET AND DECIMALS.															
		Dry.	Wet.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	13.5.	13.75.	Ceiling, 14.0.
	°		°	°	°	°	°	°		°	°	°	°	°	°	°	°	°	°
10 a.m. -	5	49.5	44.8	48.9	[illegible].0	49.7	49.7	49.7	49.7	50.0	49.9	49.9	50.0	50.0	50.0	50.2	50.1	50.5	51.0
11 „ -	252	53.3	47.7	56.2	[illegible]6.3	56.9	56.2	55.5	55.0	55.0	54.3	54.0	53.7	53.0	52.8	52.8	52.8	52.9	52.3
1 p.m. -	348	54.3	48.1	56.0	[illegible]	56.8	56.1	55.8	55.4	55.2	53.1	54.9	54.7	54.2	54.1	54.2	54.	54.4	54.2
3 „ -	249	58.2	51.0	60.0	[illegible].1	60.8	60.	60.0	60.2	60.0	50.3	59.1	58.7	58.3	57.9	57.7	57.9	57.8	57.2

All blinds down, and ventilator closed during the day.

Day fine, but light fog; wind, south-westerly. Light breeze.

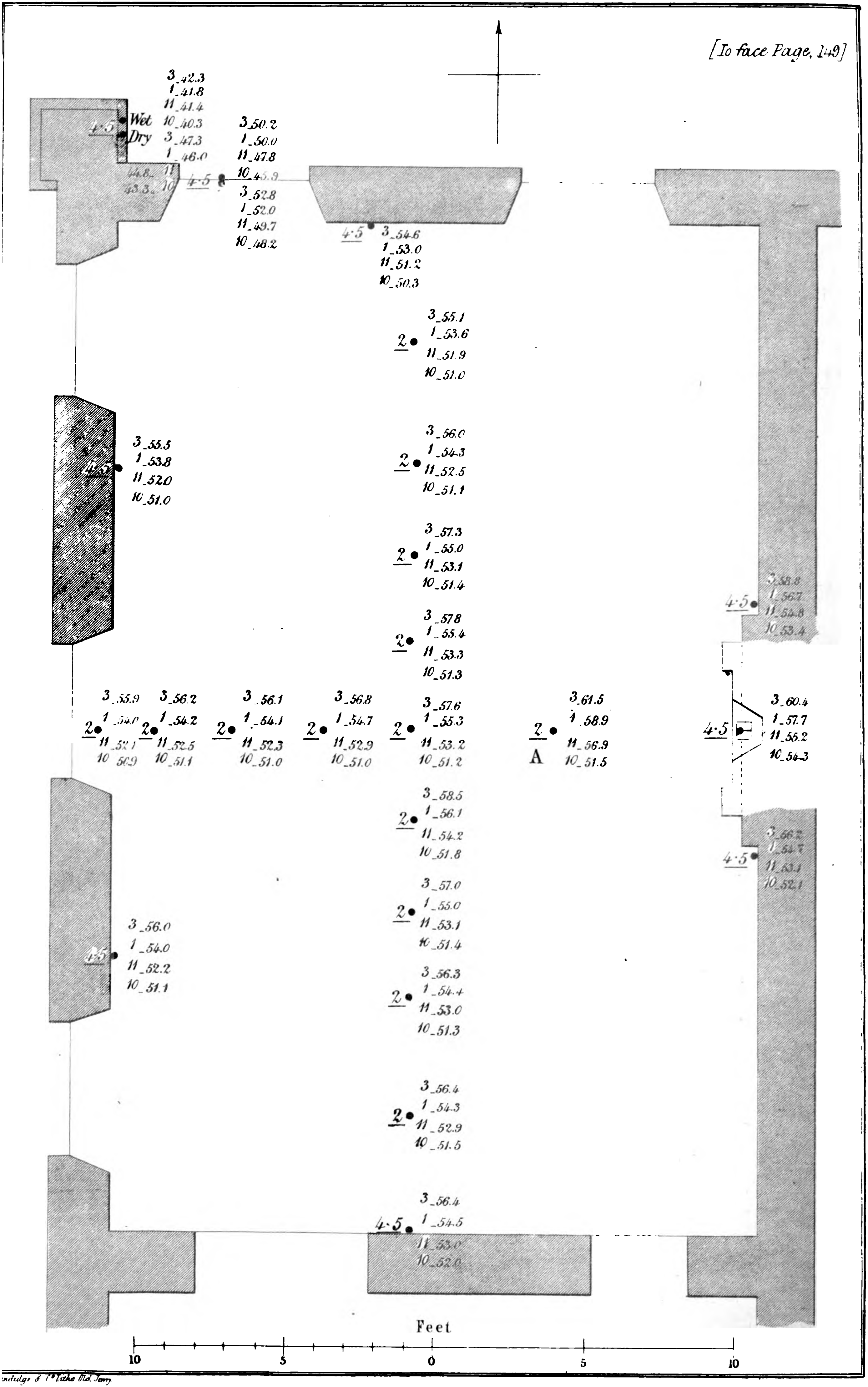
[To face page 148.]



Standidge & Co. Litho. Old Jewry

No. 320. Ordered, by The House of Commons to be printed, 25th August 1857.

[To face Page 149]



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No. 320. Ordered by The House of Commons to be printed 25th August 1857.

Henry Hansard, Printer

GENERAL BOARD OF HEALTH.

BOARD ROOM.—ARNOTT'S STOVE.

THE black marks on the Plan represent the bulbs of the thermometers.

The black figures, with a line under them, indicate the heights of the bulbs above the floor in feet and decimals; the other black figures express the times of observation; and the red figures are the observations.

The aperture in the chimney throat is 6 inches by 6.5 inches; but the centre piece upon which the valve acts is 0.5 of an inch, therefore the aperture is 6 × 6 inches, or 36 inches area.

FRIDAY, 27TH MARCH 1857.

Fire lighted at 10.30 a. m.

Observations from 1 foot to Ceiling, taken at the point A.

TIME.	On Fire, 10 Inches from Valve in Chimney Throat.	At Chimney-pot, 2 Inches below the Top.	Centre of Room, 6 Feet from Floor.		HEIGHTS FROM FLOOR IN FEET AND DECIMALS.															
			Thermometers.		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	13.5.	17.75.	Ceiling, 14.
			Dry.	Wet.																
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°		°	°	°
10 a.m.	0	0	52.0	47.0	51.1	51.5	51.9	52.0	51.9	52.0	52.2	52.2	2.2	52.3	52.2	52.4	52.8	52.9	53.0	53.2
11 "	188	98	54.0	49.0	56.2	56.9	56.7	56.2	56.2	56.0	55.7	55.2	55.0	54.8	54.3	54.2	54.3	54.3	54.	54.2
1 p.m.	220	112	56.0	19.8	58.2	58.9	58.7	58.0	58.1	58.0	57.2	57.0	56.8	56.5	56.0	56.0	56.1	56.1	56.1	56.1
3 "	258	122	58.7	51.9	61.7	61.5	61.9	60.9	61.0	60.7	60.2	59.8	59.2	58.9	58.2	58.0	58.2	58.3	58.3	58.1

All blinds down and ventilator closed.

Day dull; wind south-westerly; light breeze.

Diameter of chimney-pot, 10 inches. Area, 78.5 inches.

GENERAL BOARD OF HEALTH.

BOARD ROOM.—ARNOTT'S STOVE.

THE black marks on the Plan represent the bulbs of the thermometers.

The black figures with a line under them indicate the heights of the bulbs above the floor in feet and decimals; the other black figures express the times of observation; and the red figures are the observations.

The aperture in the chimney throat is 6 inches by 6.5 inches; but the centre piece upon which the valve acts is 0.5 of an inch; therefore the aperture is 6 × 6 inches, or 36 inches area.

MONDAY, 30TH MARCH 1857.

Fire lighted at 10.30 a.m.

Observations from 1 foot to Ceiling, taken at point A.

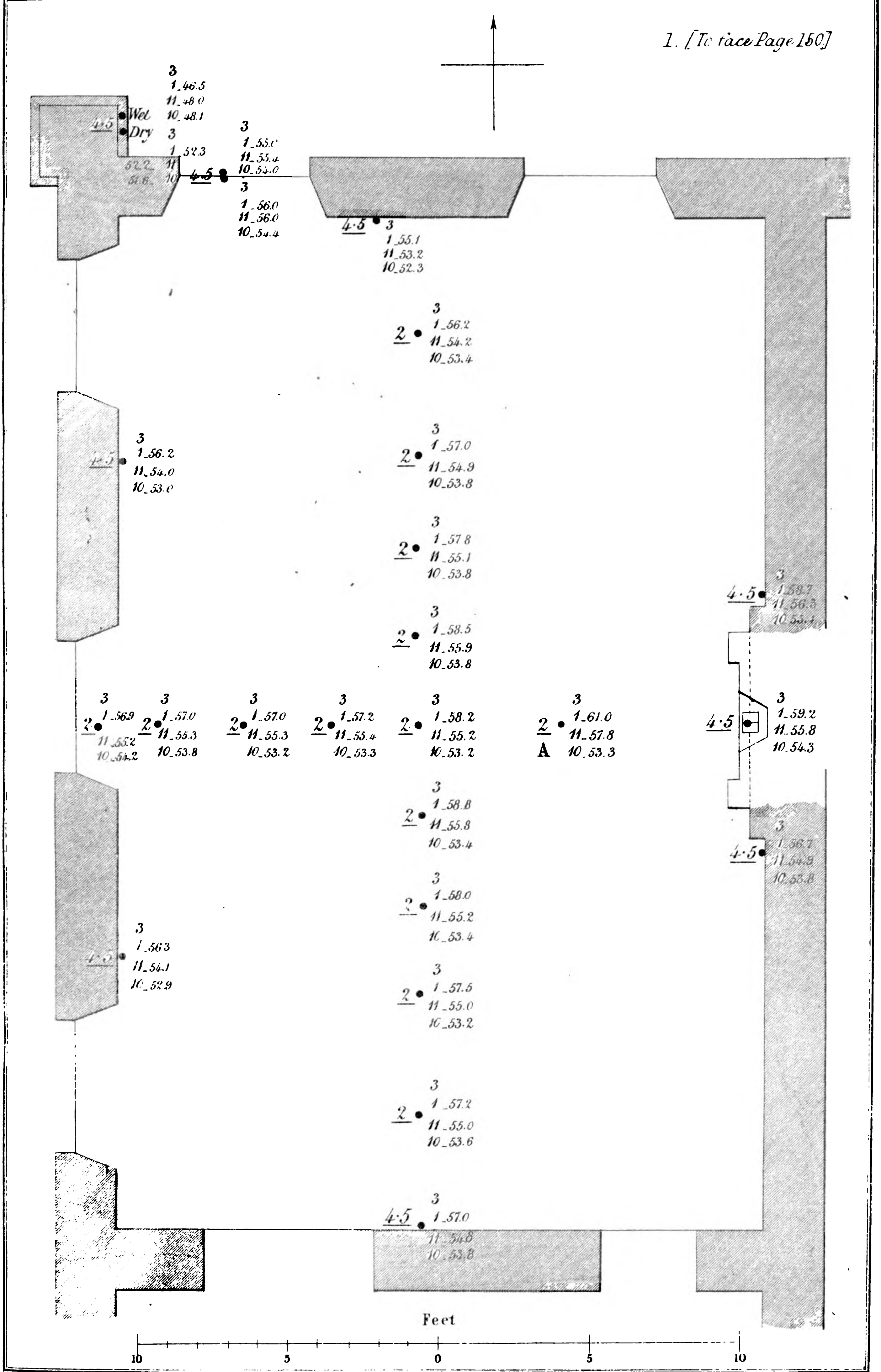
TIME.	On Fire, 10 Inches from Valve in Chimney Throat.	Chimney, at Ventilator near Ceiling of Room.	At Chimney-pot, 2 Inches below the Top.	Centre of Room, 6 Feet from Floor. Thermometers. Dry.	Wet.	HEIGHTS FROM FLOOR IN FEET AND DECIMALS. 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	13.5.	13.75.	Ceiling, 14.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
10 a.m. •	0	0	0	53.8	48.0	53.3	53.3	53.8	53.8	53.0	53.6	51.0	53.8	53.9	54.0	53.9	53.8	54.0	54.0	54.1	54.2
11 „ •	160	83	77	55.9	50.8	57.8	[illegible]	58.0	57.8	57.2	57.2	57.0	56.6	56.5	56.2	56.0	55.8	55.8	56.0	56.1	56.1
1 p.m. •	148	91	91	58.5	52.7	60.8	[illegible]	61.0	60.5	60.3	[illegible]	[illegible]	59.3	57.2	58.7	58.0	58.0	58.1	58.2	58.4	58.2

Blinds down, and ventilator open.

Cloudy day; wind south-westerly; fresh breeze.

Diameter of chimney-pot, 10 inches. Area, 78.5 inches.

1. [To face Page 150]



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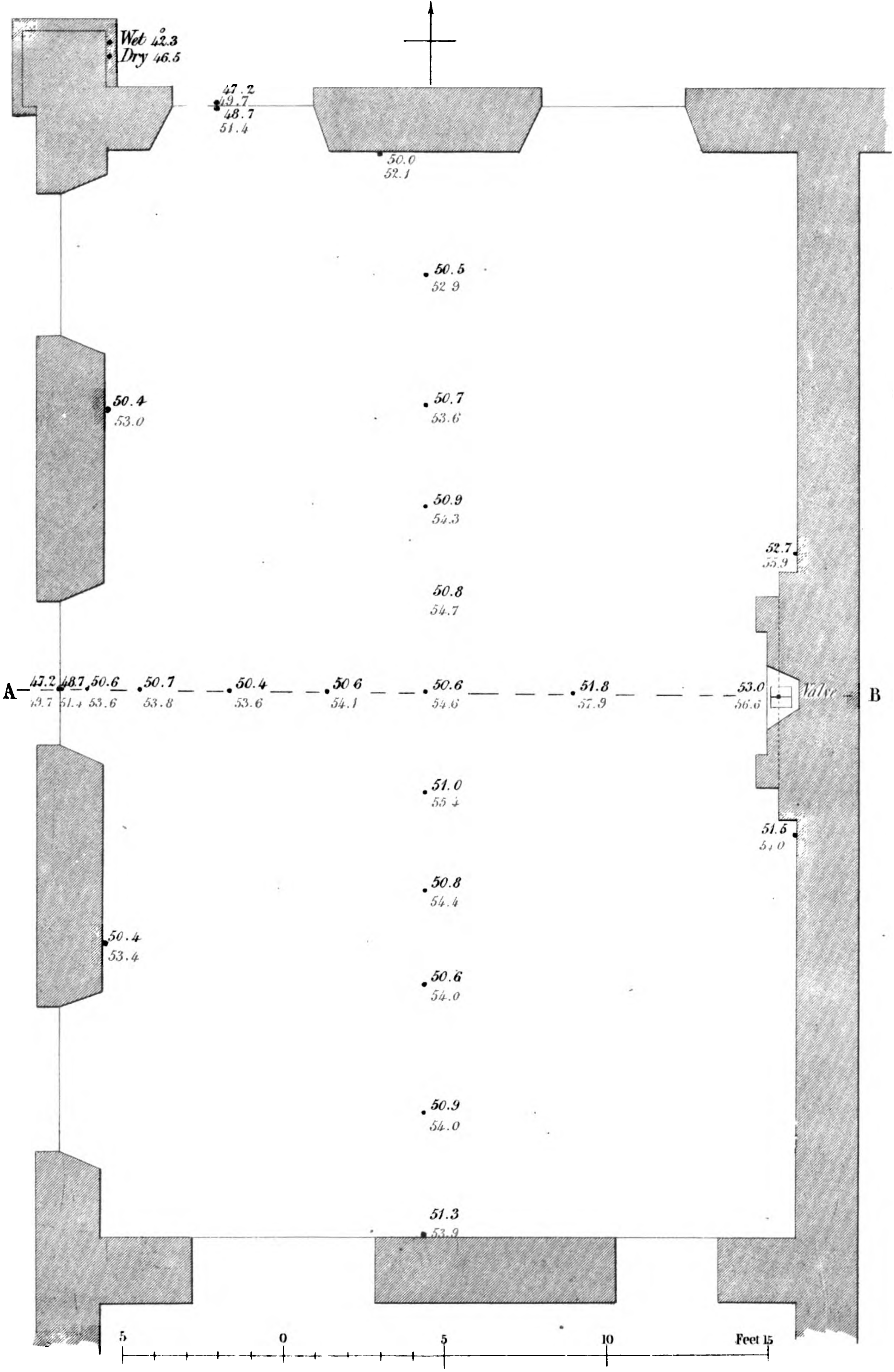
Henry Hansard P.

2 [To face Page 15

Plan of Board-Room Floor, showing positions of Thermometers and external and internal Temperature before and after the fire was lighted. Means deduced from 375 readings.



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No. 320. Ordered by The House of Commons to be printed, 25th August 18

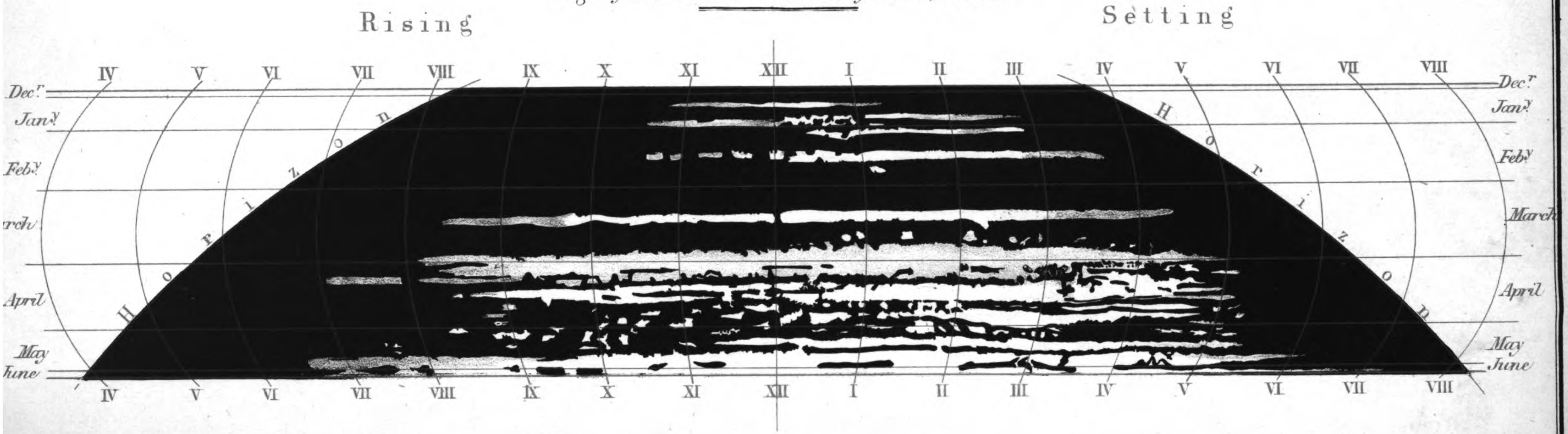
[illegible] Hansard.

1. [Before p. 151.]

SUN'S BURNING POWER

From Decr. 21/55 to June 21/56.

REGISTERED AT THE GENERAL BOARD OF HEALTH WHITEHALL.
BY
JOHN C. HAILE ESQRE.
WITH
CAMPBELL'S REGISTERING SUN-DIAL.
Latitude 51°.30′.14″ N. Longitude 0°.7′.34″ W.
Height of Instrument above the level of the sea 76·35 Feet.



The White portions of the drawing indicate sunshine.
The Black portions show when the sun was obscured.
The marks burned during this period were shallow.
The radiant heat indicated by a black bulb thermometer was considerable.

Standidge & Co. Litho, London.

1. [Before p. 151]

SUN'S BURNING POWER

From Decr. 21/55 to June 21/56.

REGISTERED AT THE GENERAL BOARD OF HEALTH WHITEHALL.

BY

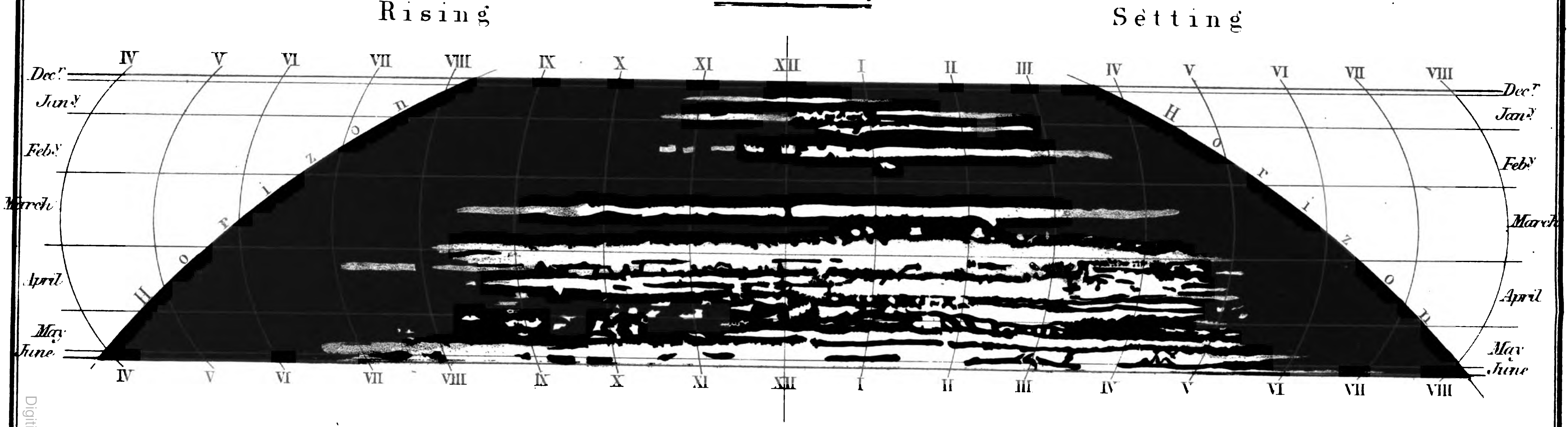
JOHN C. HAILE ESQre.

WITH

CAMPBELL'S REGISTERING SUN-DIAL.

Latitude 51°.30′.14″N. Longitude 0°.7′.34″W.

Height of Instrument above the level of the sea 76·35 Feet.



The White portions of the drawing indicate sunshine.
The Black portions show when the sun was obscured.
The marks burned during this period were shallow.
The radiant heat indicated by a black bulb thermometer was considerable.

Standidge & Co. Litho, London

2. [Before p. 151]

SUN'S BURNING POWER

From June 21/55 to Decr. 21/55.

REGISTERED AT THE GENERAL BOARD OF HEALTH WHITEHALL.

BY

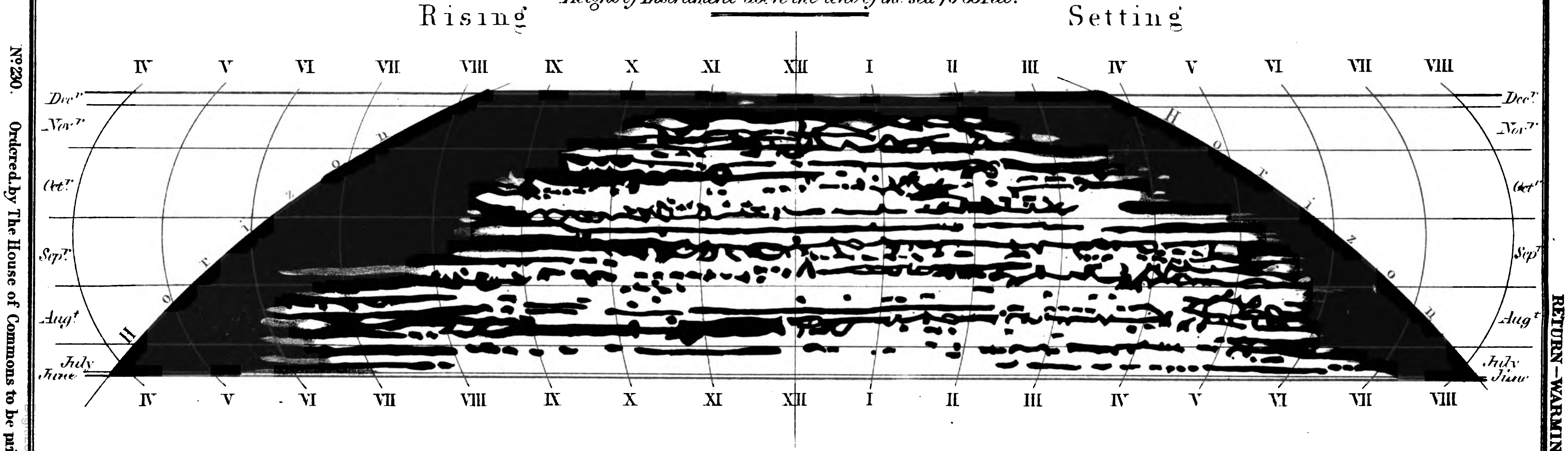
JOHN C. HAILE ESQRE.

WITH

CAMPBELL'S REGISTERING SUN-DIAL.

Latitude 51°30′14″N. Longitude 0°7′.34″W.

Height of Instrument above the level of the sea 76·35 Feet.



The White portions of the drawing indicate sunshine.
The Black portions show when the sun was obscured.
The marks burned during this period were moderately deep.

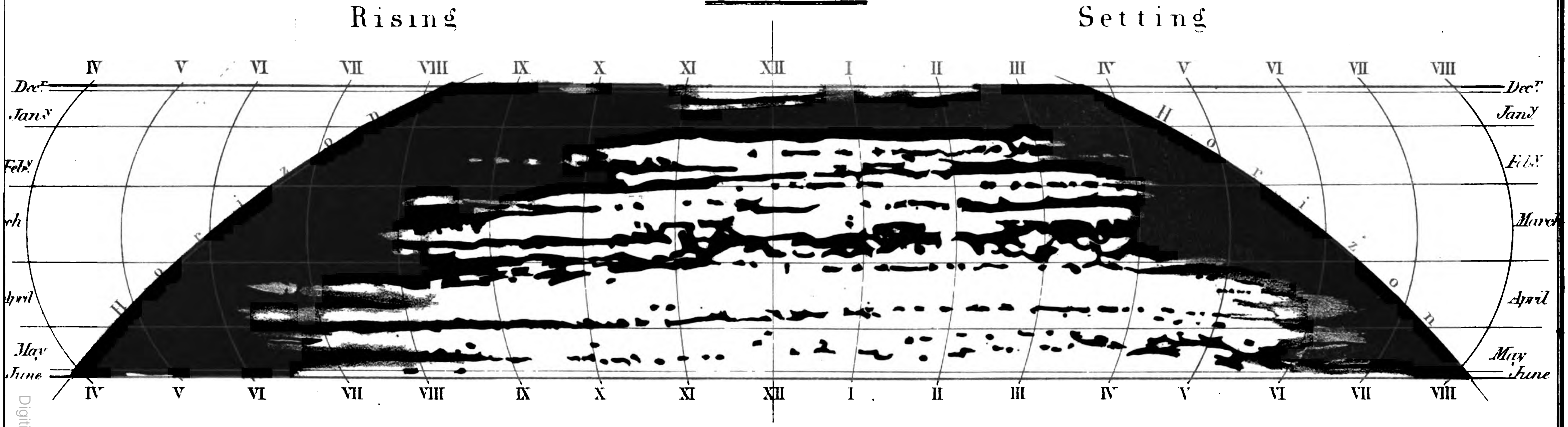
Standidge & Co. Litho London.

3 [Before p 161]

SUN'S BURNING POWER

From Decr. 21/54 to June 21/55

REGISTERED AT THE GENERAL BOARD OF HEALTH WHITEHALL.
BY
JOHN C. HAILE ESQRE.
WITH
CAMPBELL'S REGISTERING SUN-DIAL.
Latitude 51°30′14″N. Longitude 0°7′.34″W.
Height of Instrument above the level of the sea 76·35 Feet.



The White portions of the drawing indicate sunshine.
The Black portions show when the sun was obscured.
The marks burned during this period were very deep.

Standidge & Co. Litho. London.

EXPLANATION of DIAGRAMS taken from CAMPBELL'S REGISTERING SUN-DIAL, and intended to illustrate some of the Effects of SMOKE on the ATMOSPHERE of TOWNS.

THE accompanying diagrams illustrate the sun's burning power at the General Board of Health (the place of observation) during a period of 18 consecutive months, from 21 December 1854 to 21 June 1856.

The drawings were taken from wooden bowls, in each of which a spherical lens was so placed during a period of six months as to bring the sun's rays to a focus on the surface of the wood whenever the sun was visible. The sun's position in the sky varies every day, as well as every instant of the day. From sunrise to sunset the sun appears to travel from east to west, and when unobscured the rays collected by the lens burn a mark on the wood corresponding with the sun's course in the sky. The line described in the sky by the sun and copied on the wood by the sun's image is a portion of a spiral, a part of which is cut off by the horizon and by the edge of the wooden bowl, which in the dial corresponds to the visible horizon.

Each day, from December to June, the sun rises higher in the sky, and the segment of the spiral becomes larger as the days lengthen. The sun descends in the sky as the days shorten, and the portion of the spiral above the horizon and marked on the bowl becomes smaller; but if a cloud passes over the sun, if a fog obscures the sky for a short period or for a succession of days, or if any part of the sky be permanently obscured by smoke or otherwise, the line marked on the wooden bowl is interrupted at points opposite to those parts of the sky where the sun is invisible; the wood is less deeply marked when the sun's rays are partially obscured.

The marks burned on the bowls were copied by fixing silver paper in the inside, and by rubbing the surface of the paper with a black substance. The depressions burned in the wood by the sun show white on the paper, while the original surface, where left unburned, is shown black. A segment of a spiral drawn on a hollow hemisphere, when so copied and the paper laid flat, becomes a succession of nearly parallel lines. The lines drawn by the image of the sun partially obliterate each other if drawn on successive days, because the image formed by the lens covers a certain space on the wood, as the sun occupies a space in the sky, and because the image, like the sun, does not move its own breadth each day. The white portions of the drawings indicate sunshine, the black portions show cloud or mist.

The red figures and lines correspond with the hours of the day, and with the meridian lines, as drawn on globes. A glance at any one of the drawings is sufficient to show that the burning power of the sun was usually less before than it was after noon at the place of observation during 18 months.

The marks approach the edge of the bowl opposite to the western horizon, much nearer than that opposite to the eastern, and on the bowls they are shallower opposite to the eastern sky. The greater portion of London is to the eastward of the Board of Health. The smoke rises most and obscures the sky most in that direction; and that circumstance appears sufficient to explain the remarkable difference in the burning power of the sun's rays in the morning and in the evening. Experiments are now being tried with this instrument to test the comparative burning power of the sun's rays in London and in the country, within and beyond the influence of the smoke.*

J. F. Campbell.

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* *Note.*—February 1859. The experiment alluded to was tried from Christmas 1857 to 22d June 1858, by exposing three dials, two in London, and one at a distance of about 30 miles from it. The result was, that the dial furthest from the centre of London was most marked, and was equally marked by the rays of the rising and setting sun, in the morning and in the evening; while those in London were least marked on that side where the sun was most obscured by the smoke; showing that the smoke of London exercises a considerable influence on its climate.

J. F. C.

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